

## Briefing

### Atkins bureau taken over by US firm

AS predicted (CW, July 21), Atkins Computing Services of Epsom has been taken over by the US firm's subsidiary, On-Line Systems Inc. OLS is to pay £1.1 million to the bureau's parent, the W. S. Atkins group, partly in the form of 32,000 OLS shares which will make W. S. Atkins one of the largest shareholders in OLS.

The existing OLS subsidiary in the UK, based in North London, will be merged with the Atkins Computer Services operation to form a joint subsidiary with headquarters in Epsom.

### System X plans

THE first System X telephone switching contracts are expected to be placed by the Post Office within the next month. One proposal being considered is that the project should be controlled by a company jointly owned by the three main contractors, GEC, Plessey and STC.

### Link decision

A DECISION on whether to stay with Univac or go over to IBM for mainframes to handle its planned online network is likely to be made by the Union Bank of Switzerland by the end of this year. IBS is currently studying the relative merits of converting its Univac 490 based software to Univac 1100 or IBM 370.

### Four-day week

AFTER making a loss of more than \$1 million in the first nine months of its 1977 fiscal year, Calcomp has put most of its employees on a four day working week. Calcomp president George Canova, stressed that this will not affect production on the disc drive and graphics involved. Calcomp employees in the UK and Europe will continue working five days.

### After System 3...

IN just over a year from now the IBM System 3 range could be completely superseded by the Series 30 family following the introduction of the System 36 which is expected to be a powerful database management system that will replace the System 3 Models 12 and 16.

### The micro revolution

The microprocessor is now technological development that is having a genuine revolutionary effect upon the market. In this week's survey Martin Banks, CW's new microprocessor correspondent, looks at the new arena into which these devices will take computing. Alex d'Agapayoff and Martin Halsey consider the impact on the UP department and on business systems, respectively, and the home brewed scene is reviewed by Quentin Scott. Pages 11/14

## University College switches from mainframe to minis

A BREAK with the tradition of having a central mainframe to provide a university computing service is being made by London's University College, which is to replace its 11-year-old IBM 360/65 by six linked minicomputers.

And the decision could mean a prestige order for GEC, because the UK manufacturer is one of the three companies bidding for the order. The other two are the US firms Digital Equipment and Prime. The GEC machines being offered are 4082s.

The acceptance of University College's latest proposal, at a meeting of the Department of Education and Science's Computer Board last week, brought an end to 18 months of indecision. The college originally chose a 370/168 and later modified its choice to a 370/158. It was encouraged to buy British, so changed to a 2080.

The Computer Board agreed that a large 2080 was needed in London University but had already pencilled in Queen Mary College as the likely site, possibly with a Distributed Array Processor.

This led to the unusual move of installing a network of minicomputers instead of a single mainframe.

"We decided that this approach was the most cost-effective as we have such a wide range of users," said Chris Kennington, head of the systems group at University College. "We do everything from text processing to economic modelling. We expect to support a very large number of terminals, as many as 150 at a time."

Kennington said the minicomputers would probably be installed together at

one site. This would allow very high speed communications between processors and also make maintenance easier as one machine could be taken out of action and the others reconfigured.

The first minicomputer will be installed by the end of the year so that software development can begin. Up to six are expected to be installed within two years. The college will remain a user of the big University of London Computer Centre and a lot of its purely IBM applications will be transferred to the 370s at Cambridge and Newcastle.

## PROCUREMENT POLICY

# Govt snubs Neddy's advice

THE Government has ignored recommendations from the National Economic Development Office's Computer Sector Working Party for an extension of the procurement policy to cover minicomputers and peripherals in the whole public sector. This move was reported exclusively in Computer Weekly (CW, July 21).

The new policy, announced in Parliament last week by Civil Service Minister Charles Morris, is virtually a continuation of the existing policy with single tendering applying to mainframes from the ICL 1904S and 2060 upwards in central government, including universities, local government and nationalised industries, and asked to "take note" of the policy.

Morris, however, left the door open for multi-mini configurations, such as that approved this week by the Computer Board for University College, London (see above), by saying, "The policy does not commit the government to purchasing a large computer within the defined power range where it would be more efficient to meet a particular requirement by a system made up of smaller machines."

Morris also stressed the "important proviso" that single tender orders will be "subject to satisfactory performance and delivery dates."

This emphasis is understood to have been influenced by current studies of government contracts being undertaken by the Committee of Public Accounts.



Charles Morris... "government is ready to co-operate in any co-ordinated European approach to public procurement."

Turn to page 2

## IBM partner picks 470

DEALING a blow to IBM, Andahl has just installed a 470V/6 mainframe with one of IBM's two partners in the Satellite Business Systems venture, the Aetna Life and Casualty insurance company. Aetna Life has installed the 470 alongside a complex of IBM 370/168s in Hartford, Connecticut.

Meanwhile, the next European installation and the fourth bank customer for Andahl, is Credit Suisse, which claims to be Switzerland's oldest big bank. The bank has three IBM 370/168s recently upgraded to 168-3s, at its Zurich headquarters.

Andahl's most prestigious banking customer so far is the US Federal Reserve Board, the equivalent of the Bank of England, which has just installed a 470V/6 in Washington. The other Andahl banking customers are Bank of Montreal and one of the major New York banks.

Andahl's 470 is expected to be completed to them. The installation supports almost 1,000 VDUs throughout Switzerland (CW, April 7). The bank and Andahl both decline to say anything about the proposed installation.

## IFIP delights

THE often staid halls of IFIP will be livelier up later this month when some of the excitement from the 49th Parallel will transport over to Toronto. Hash Wiener gives a foretaste of some of the delights that the outside delegates may enjoy. Page 4

## IBM reveals all

THE attitude of IBM to its rival systems software developers seems to be changing. The company invited several such firms to a

## ALSO.....

- Computerworld - on R&D 2
- Focus on black-outs 2
- Cool Board Soviet link-up 3
- Post Office linked by robot 3
- Downing's IFIP preview 4
- Letters to the Editor 4
- Op Spot 5
- Comms show for Midlands 5
- File Design 6
- Puzzler 6
- Programmer Notes 6
- Software File 6/7
- Microprocessor News 6
- People in the News 10
- Where no computer has been 11
- Decision tables criticism 40

## Unions threaten action in ICL pay dispute

INDUSTRIAL action has been threatened by the unions involved in pay negotiations with ICL unless the company makes an improved offer on a proposed productivity-linked scheme by August 5.

A joint national meeting between APEX, EESA (Financial and Engineering Staff Association), ASTMS, ACTSS (Association of Clerical, Technical and Supervisory Staff), and ICL was held last week, in which the company reiterated that it was willing to make an offer within Phase 2, backdated to July 2.

It also proposed a bonus scheme linked to profits/improvement dependent on profit in 1977/78, and not calculated on turnover alone as under the 1975 pay plan.

ASTMS: "The payments would be relatively low, according to the company less than one per cent on basic salaries on the proposed profit for 1987/77, and no payments would be made until June, 1978. This was rejected by the unions."

The unions then stated that the self-financing scheme should be introduced with "improved payments" from August 1, 1977, no followed by the Government White Paper.

But according to the unions, no further offer has yet been received, and they are now strongly recommending that industrial action be taken unless ICL makes an improved offer.

## NCR's advanced architecture

A LARGE degree of compatibility with international standards, is the principal feature of a new network architecture announced by NCR.

Called NCR/DNA, Distributed Network Architecture, it is designed to consolidate NCR's dominant position in the retail systems and funds transfer markets. In contrast to IBM's NSA, control is distributed throughout the network.

A main element of DNA Data Link Control, which bit-oriented and similar to the ANSI ADCCP and the HDLC protocols, Compatibility with other vendors' equipment conforming to these standards and also to IBM's SDLC will be provided. DLC also provides interface to the CCITT X.25 packet-switching interface.

Compelec presents the SOROC V.D.U.

CURSOR CONTROL: Forepage, Backspace, up, down, new line, return, home, top, PLUS ABSOLUTE CURSOR ADDRESSING. TRANSMISSION MODES: Conversion (half and full duplex), PLUS BLOCK MODE - transmit a page at a time. FIELD PROTECTION: Any part of the display can be "protected" to prevent overwriting. Protected fields are displayed at reduced intensity. EDITING: Clear screen, typeover, absolute cursor addressing, erase to end of page, erase to end of line, erase to end of field. PRICES SLASHED!! Come to us for all your Microprocessor requirements. We are the exclusive Atari Agents. COMPELEC ELECTRONICS 310 Kilburn High Road, London, N.W.6 Tel: 01-228 1124







by Chad

## There's no business like US show business

IF YOU have never been to a major computer exhibition in the United States, there could be one thing at IFIP that you cannot adequately prepare for: American showmanship. And Toronto is just close enough to the US, culturally as well as geographically, to become the first show to which Americans will export their amazing promotions.

At the National Computer Conference in Dallas, visitors from abroad, even the jaded journalists, were startled by what they saw. Many of these roving reporters thought they had seen it all at the Hannover Fairs, the SICOBs and the Compeca.

But they hadn't. US companies attend European exhibitions all the time, but they try to adopt the ways of their hosts. They are no point in emphasising the foreign origin of their products in this nationalistic world. Americans are also a culturally insecure lot, easily hypnotised by crumbling old buildings and ancient social eccentricities.

In Dallas, the Americans were American. They insisted on having fun as they relayed that old message to the crowd: buy, buy, buy.

Had you been in Dallas, you might have seen Sherry the comedienne, Eddie the cardsharp, or April Tatro, America's only front-bending contortionist. You could have ogled the MFE pin-up girl or, were you a pundit of the Press Corps, sashayed off to the Basic Four rodeo.

Sherry Moreau is a perennial feature of ICC/Milgo's exhibits. She is probably the most valuable marketing asset acquired by Racal when they bought out the company. Her skills, played out on a tiny, prop-ridden stage, are written by ICC's advertising director,

Rich Nathanson. The scripts are superb, but they really work because Sherry's energy, charm and talent for ad lites have won the hearts and minds of show-goers.

Others have tried to imitate Sherry's act; they have all failed. One frustrated competitor even tried to snipe at her with a nasty advertising campaign. It has backfired. People only became more aware of Sherry's clout and, implicitly, that of her sponsor, ICC.

Eddie the cardsharp works for Datum, a manufacturer of peripheral equipment. His legendarily act, mixing magician's patter with corny but memorable comments about his employer's wares, is fascinating. His message, which reaches an audience that has been exposed to too many vendors' claims, is that technique counts.

Beauty was the word at MFE, which makes cassette drives. Its small stand was graced by a stunning model, rumoured to have been a Playboy magazine pin-up. Sadly for MFE, cheesecake turns off as many women's-liberated Americans as it turns on. It is also not very effective. This writer had to consult his notes to determine the model's sponsor, and cannot recall her name either.

From a marketing viewpoint, you might say the whole idea was a bust. The most memorable event at the NCC was not a public show, but a private party held by Basic Four, the small business system people. They invited the Press to a ranch where the otherwise sedentary journalists participated in a rodeo.

The newsmen got closer to cows and horses than they ever had before, and in return the animals got to meet the Press.

## THE ART OF LOVE...

Seen on this right studying a book on the art of love is contortionist April Tatro, who drew attention to the flexibility of Powertec power supplies at the NCC in Dallas. She has been reportedly signed up for a new Laugh-In series.



Our US correspondent Tim Wicks being taken for a ride.



## LETTERS

### Action areas for the proposed 'task force'

CONGRATULATIONS on your call for action, (CW, July 14). It is one of the most positive summaries of requirements for the computer industry that I have read for a long time. It is regrettable that such a call for action or indeed the action itself, has not come from one of the several official groups within the industry.

Most of what you say is right. However, don't get lost in the "Big Brother" syndrome. Of course human freedom is important and that must be kept in mind at all times, but it is negative thinking at a time when we need all the positive action possible.

Let's face it, by 1990, the home/business computer linked into a national information grid will be fact, not fiction. When Graham Bell introduced the telephone in 1876, there were many public protests over its invasion of privacy.

I would add three further points to what I have read in Computer Weekly:

1. Industry, in general, does not have the necessary financial resources to invest in automation and allied technology up to the level you imply. It may want economies but how is it going to afford the front-end expenditure? Government grants or interest free loans? This is a question for our governmental policy makers.
2. Once set up, a call for action task force should also consider the export marketing aspects of the systems and hardware expertise built up by our own accelerated adoption of information technology.
3. The computer itself has been responsible for the human interface problem. Old batch processing systems generated the watertight department attitude — raw information went in and cooked information came out. As the outside employee or recipient

of "cooked" data did not know what went on inside the computer department, they naturally blamed the computer for all errors.

Batch processing is being replaced by distributed processing and applications oriented systems.

These will take away much of the DP manager's day-to-day responsibilities, placing them on the shoulders of the application user.

The warehouse manager will be responsible for his distribution system, the accountant for his number cruncher, and the factory manager for his production control system. The accounts clerks and progress chasers will become the computer operators.

In this way, information technology will be brought nearer to the user and hence the barrier between man and computer will gradually disappear.

A new breed of DPM will grow. Most medium-sized companies may not even have one. The DP manager's role will cease to exist at the small system end as hardware becomes more physically integrated into company offices and software becomes easier, only occasionally being visited by a service engineer. Its terminals will be used like telephones. As large companies today have their telecom managers so will large companies have computer managers — people who know all about the application of information technology.

The telephone is a good analogy as it has caused a quiet revolution over the last 100 years in business and pleasure. We, however, cannot afford to wait for 100 years for the human interface to sort itself out and I therefore applaud your initiative.

TIM WICKS  
Chairman

Interco Business Consultants Ltd, Kingston-upon-Thames, Surrey.

## Biography

WE are undertaking a biography of the late Alan Turing, FRS, and would welcome information both professional and personal, which will if necessary be treated in confidence.

STEPHEN COHEN  
ANDREW HODGES  
29 Temple Road  
Windsor  
SL4 1HW.

## ACOUSTIC COUPLERS

Contact  
MOORE REED & CO. LTD.  
Walsworth, Andover, Hants  
Tgl Andover 4185

## STOP WASTING MONEY!

MicroSim 8080

The world's most advanced program development system  
ALLEN COMPUTER SERVICES LTD  
01-955 1555 (local) 10, 50 pence Rev. 8011 361

## The alternative to IBM.

Disk drives, tape units, memories, terminals, printers, systems  
Telex Computer Products UK Ltd  
213 Oxford St, London W1 0L 793 9131

TELEX

## OP SPOT

Comfortable rest rooms for operators, equipped with chairs, aettas, television set, refrigerator, table, cooker, and sink — la this a dream or a reality...?

IN some installations, operators are provided with comfortable rest rooms and facilities. But surely these are in the minority. Most requests for facilities to be provided for operators are met with a refusal, usually on financial grounds.

Operators are quite justified in claiming well equipped rest rooms, even more so if they are working irregular hours. The cost of equipping a rest room is only a fraction of the annual DP budget, and will be more than recouped by improved staff loyalty and relations — and improved efficiency.

The benefits of installing comfortable rest and leisure areas are numerous. Engineers suddenly begin to use your site as a base when they are not on call-out, and in some cases the engineers are willing to provide an unofficial service outside normal contract hours.

In addition to benefiting from this improved engineering service, the facilities are available during normal working hours to be utilised by the entire DP staff, including the DPM.

On Spot supports the opinion that adequate facilities should be provided for operators. DPMs, when refusing requests for these facilities, should consider the implications of their decision.

The improved efficiency that can result from the new facilities may well compensate for the cost of the exercise.

## 2960 for Hong Kong

FOLLOWING its order for a dual 2970, the Hong Kong government has, as expected, chosen a 2960 as an upgrade for the 1902A at the Treasury.

The new machine is to be a 2960, due for installation early next year. It will initially take on the workload of the 1902A under the 2960/DME operating system, which enables the programs to be run unchanged. However, during 1978, conversion to the large general-purpose VME/B operating system already being implemented on the government's dual 2970, will get under way.

## Name change

A CHANGE of name has been announced for Harris-Intertype, the UK subsidiary of the Harris Corporation, which will shortly be known as Harris Systems Ltd.

## Database service extended

THE transatlantic database service on offer to UK users wanting to access UK databases on the Tymnet network has now been extended to those accessible via the Telenet packet-switched network. Access is via the Post Office Datel 200 service (CW, February 3).

There is also a new international data transmission service,

## RAIR German subsidiary

THE London-based marketing firm RAIR Terminals, has set up a wholly-owned subsidiary in Cologne to sell its range of terminal products all over Germany. These include the Digital Equipment DECwriter II and III

## Racal seeks loan powers for more takeovers

FOLLOWING the acquisitions of Milgo Corp of Florida and Hellerann Cassettes of Crawley, Sussex, Racal Electronics is to seek shareholders' approval of an increase in the company's borrowing powers from the present £83,500,000 to £123,400,000, so as to be able to take advantage of any further acquisition opportunities as they arise.

Racal chairman Ernest Harrison forecasts sales of £200 million in the year to March 31, 1978, compared with the £122 million recorded in the last financial year (CW, June 30).

The Milgo acquisition has resulted in a major change to the balance of Racal's business, reducing the proportion accounted for by radio communications from 80% to about 65%.

The US company is to become Racal-Milgo Inc shortly, and US reports suggest that Racal is planning to hive-off the terminal division of Milgo into a separate company.

Racal's magnetic media company Racal-Zinnel is broadening its product range with four new items for the mini, micro and

terminal markets. The four lines include a floppy disc with a special friction-reducing surface coating of oxide, a tape cassette conforming to ANSI, ECMA and ISO standards, a quarter inch tape cartridge and a magnetic card for word processors and office equipment.

A new appointment has also been announced. David Elsbury, managing director of Racal-Tacticom, becomes a deputy managing director of Racal Electronics, the parent company for the whole Racal group.



Ernest Harrison... sales up from £122m to £200m forecast.

## Comms show moves to Midlands

DESCRIBED by GEC chairman Lord Nelaon as the Farnborough of the communications industry, the biennial Communications Show has outgrown its birthplace in Brighton and next year moves to the National Exhibition Centre in Birmingham.

The 1976 show boasted twice as many exhibitors as its predecessor in 1974, and next year will have three times the exhibition space of 1976. Yet only 20% of the stand space remains unbooked and the organisers expect to have a full house by the end of the year.

Another change is that the event is moving from June to April. It will open on Tuesday, April 4, and those interested in data communications should mark April 5, when the associated seminar will concentrate on FTT telecommunications. Themes for the other two days will be mobile radio communications on Thursday, April 6, and defence communications the final day, April 7.

In aid of disabled and blind computer staff

# COMPUTER WEEKLY'S Annual Charity Ball

## The industry's big night out

Computer Weekly is holding its second Charity Ball. Last year we celebrated our tenth anniversary, this year we are just celebrating. Come and join in the big night out for the computer industry and help us raise funds for the MATE project. Proceeds from the Ball are to be donated to the British Computer Society Specialist Group for the

disabled to aid the development of MATE II, a memory-assisted keyboard terminal designed for use by disabled and blind people. The Ball is being held under the patronage of the BCS and we invite all our readers to support this very worthwhile cause and at the same time enjoy a pleasant evening with friends and colleagues.

Tickets are £12 each and include dinner, cabaret and dancing until 2 am

Tables for parties of 10 can be reserved on request

## Friday October 14 at the Royal Lancaster

### Order Form COMPUTER WEEKLY Charity Ball

Tickets are available at £12 for a single ticket. Included in the price is a dinner, cabaret and dancing until 2 am.

Please send me ☐ single tickets at £12 per head (enter number required)

Please reserve ☐ table(s) for me (10 places at £12 per head)

My cheque for £ is attached (cheques should be made payable to IPC Business Press)

When completed this order form should be returned together with your cheque to: Tony Higgins, Computer Weekly, Dorset House, Stamford Street, London SE1 8LU.

Please send the tickets to me at the following address:

Name

Company

Address

Signature



## FILE DESIGN Part 6

By Owen Hanson

COMPUTER manufacturers provide well-supported software to aid the indexed sequential file designer. This is so convenient that the technique is often used when it is not appropriate, and the costs outweigh the benefits. The first question to ask is: should IS be used?

If an application requires only direct access, an IS file will always be at least 10% slower than a well-designed direct file, because a minimum of one head movement is necessary, to the required cylinder, followed by searches of the index and honic tracks.

In the usual case, when the highest level index is not held in main storage, there will be two head movements and the time taken to locate a record may be up to twice that required by a direct file.

An individual enquiry will not be noticeably delayed, but the inquiry throughput will be limited. Thus, unless there is an additional need for sequential processing, or the inquiry volume is low, direct-only applications call for directly organised files.

Sequential applications are more complex. IS files allow both records (or blocks) and whole tracks to be skipped if they are not required. Some sequential files are so formatted that every record has to be read, whether it is to be processed or not. Others allow inactive records to be skipped; however, there is no way of skipping unwanted tracks or cylinders using a non-indexed file.

If the hit rate is high there is little opportunity to use skip-sequential processing, and a sequential file would be suitable.

Figure 1 shows the relationship between the number of records or blocks per track, the average hit rate per record (or per block), and the percentage of tracks that do not require updating.

The curves shown will apply for blocks; for individual records they hold for low hit rates, and when a hit rate of 70% means an average of one hit per record, ie some records may be hit more than once, rather than exactly one hit per record.

An IS file will save processing time, in comparison with a sequential file that can be

skip-processed, when more than about 35% of the tracks can be skipped. This is shown in figure 1. By reading the figure from the appropriate curve, the file designer can decide which technique to use.

If the sequential file cannot be skip-processed, an IS file will save time when an average of one or more records can be skipped from every pair of tracks. The precise figure is easily calculated in any given case, and the average break-even hit rate is fairly high. It is markedly lowered when processing is trivial or buffering very effective.

A genuinely mixed sequential/direct application will almost always require an IS file.

To optimise IS file design the following points should be considered:

1. Blocking factors. Larger blocks will mean a higher effective hit rate; the details were given in Part 2. If record hit rate is low, it is often worth exploiting this, rather than saving blocking storage space by blocking.

2. Indices. Record keys should not be longer than necessary as this will increase the size of the indices. The highest level index should be held in main storage if possible; this will often be a better use of space than employing large data blocks. If the whole index is too large, IBM systems will hold part of the index in main storage, which still speeds up average reference time.

When the highest level index is too large for main storage, it should be held on the fastest direct-access device available, thus keeping the overall record seek time as low as possible.

3. Overflow area. When no additions are expected, the designer should ensure that overflow areas are not allocated.

In handling additions, the alternatives are: to leave space in each block or track; to leave one or two tracks per cylinder empty; to provide a separate area. The first causes a low data packing density, so the usual course is to choose a mixture of alternatives two and three.

The details of any IS file organisation technique are given in manufacturers' manuals. This article has briefly discussed the general considerations that apply to all such systems.

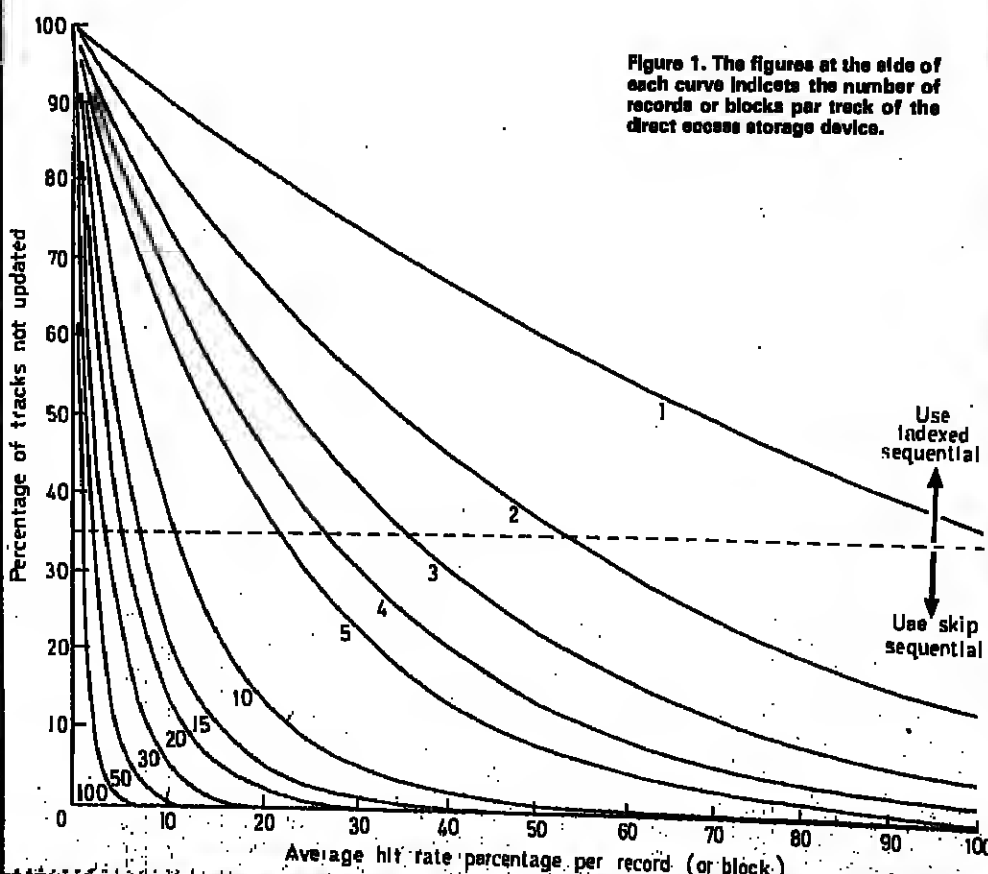


Figure 1. The figures at the side of each curve indicate the number of records or blocks per track of the direct access storage device.

## SOFTWARE FILE

## Atkins' success with CAD in small firm

AN example of the savings which computer-aided design can make in even a small company has been given by ISA Controls, of Shildon, County Durham, which claims to have made savings of

"hundreds of man-hours and thousands of pounds" with a design program developed for the firm by Atkins Computing Services and run on Atkins' Epson, Sunny-based

The program aids design of offices to the passage of liquids and gases in chemical and petrochemical industries. Calculations for design were previously performed with slide rules or electronic calculators. The two programs produced for ISA, Orifinap, working in Imperial units, and Orifinap, working in metric, can be made available to any client with similar problems, said Atkins.

## Success for Pansophic with Easytrieve pack spin off

AN insight into the way that a software product can prove eminently applicable to an area for which it was not originally designed, is provided by Pansophic Systems' release of Easyaudit.

This is a trivially amended version of its Easytrieve Information retrieval package, aimed at providing DP auditors with a tool to examine the data in an installation's computer files.

Easyaudit has had immediate success with an order from a major oil company, covering about 12 installations, in the US and a similar number in other countries. The order represents an income of about £250,000 (£144,500) to Pansophic.

The auditing area is particularly ripe for an approach from the software market, bearing as it does on the increasingly important question of computer-related crime, and its attendant topics of privacy and security.

The auditor is becoming an increasingly influential figure in US computer installations, and the UK is likely to follow suit, said Pansophic chairman Dean Mohlstrom.

Easyaudit is presented with detailed documentation describing the applicability of the data retrieval function to auditing of computer records. Fundamentally, however, the only addition to the Easytrieve software comes in the form of statistical sampling routines.

"Even these will not be specialised to Easyaudit", said Mohlstrom. "They will be made available, free of charge, to any Easytrieve user who wants them."

It is hardly an accident that computer auditing is one of the first areas to be singled out with a separately identifiable product. Security and privacy has long been a particular concern of Pansophic.

Pansophic has just come to the end of its eighth year of operation, with the announcement of a record £7.1m (£4.1m) turnover for the past year. This represents a 41% increase over the previous year's figures.

Further expansion is confidently expected, with a major new Pansophic product at the beginning of next year.

## £1m target in sight

SYSTEMS house Applied Computing and Software, based in London, reports a turnover of £348,000 for the first six months of this year. This, says the company, represents considerable progress and leads it to believe that its target of £1m turnover for the whole year is attainable. Profits for the period are about £27,000.

## Puzzler

TWO tramps, some distance apart, are walking towards each other at the side of a railway track. A train overtakes one of them, takes 20 seconds to pass him, and then meets the other 10 minutes later, passing him in 18 seconds. What time will now elapse, in seconds, before the two tramps meet?

Assume constant speeds throughout. See page 30 for solution.

## PROGRAMMER NOTES

## Why are testing aids so little used?

REPLIES to our comments on testing (CW, July 14) indicate that, as we suspected, software testing aids are not very widely used. These installations which have used such aids, however, are unanimous on the large proportion of programming effort which is, or should be, devoted to testing, and the effectiveness of such aids in reducing this effort.

"Testing and debugging takes up 60% of programming time," says one correspondent. "If it does not, then, very often, it signifies that the important proving process has only been partially carried out. In this case, the results show up in the form of disasters during early, middle, or even late production running."

Although we have received fulsome praise of testing aids from their users, not one programmer has written to explain why he or she does not find testing aids effective.

Have we received a true indication of the usefulness of these aids, or are there still doubters among programmers? If not, why are the aids not more widely used? Assessments of software tools for aiding other parts of the programming process were also requested, and this request has provided a good deal of response.

Particular success seems to be enjoyed by the users of preprocessors — software packages enabling programs to be written in a specially devised high-level language. The programs are converted by the package into statements in a conventional programming language.

N. R. Pickering, of Letchworth, Herts, uses such a preprocessor to generate all new Cobol programs at his installation.

This, he claims, "has reduced coding by around 70 per cent"; good news for the large number of programmers who regard coding as second only in boredom to the preparation

of test data. His calculation, he admits, was based on a character count. It is debatable whether this accurately reflects the amount of thought which went into the preprocessor programming as against a normal Cobol program. However, Pickering points out, reduced character count also means less likelihood of punching mistakes.

Machine-time revelation, he says, is minimal. "This depends on how many times the pre-compiler is used before the Cobol source is catalogued to the source statement library. It has proved to expand a Cobol program quicker than the corresponding 'compile'."

Perhaps it would be worth looking more deeply into such products. Can anyone offer more reliable statistics (eg program development times) indicating the saving in effort? Does the use of a more concise and more readily developed language lead to more structural programming, and is this reflected in the general code? Is it better to preserve preprocessor code or Cobol as the documentation and starting point for amendments?

Turning to a related topic, a phrase often heard in conjunction with structured programming is "the chief programmer team". This basic principle of working in small teams is widely viewed as effective, but is it as effective as it could be? Research in the US claims to have uncovered a lack of "team management ability" among DP managers and chief programmers, which could be affecting productivity to a surprising degree.

On UK programmers have any thoughts on this? There must be a good many programmers who have experience of being a member of a team. What are the techniques of organisation, alternatively, what do you think your superior would be doing in this area?

## ZEUS-HERMES SPECIALISTS IN REAL-TIME SOFTWARE for microprocessor systems and software

SHROPSHIRE HOUSE 2-10 CAPPER STREET LONDON WC1E 6JA TELEPHONE 01-323 0837

## EDITED BY STEPHEN BELL

## Why IBM gave its 'rivals' a briefing

THE amount of business which IBM owes to independent producers of software for its machines has at last been recognised by the company itself.

News is beginning to emerge of a technical briefing by IBM about six weeks ago at its offices in Poughkeepsie, New York, to which representatives of all its major software "rivals" were invited.

The meeting gave valuable indications of IBM's future plans in hardware and systems software. "They showed us everything," said one software man, "and we got straight answers to all our questions, with no evasion." He added that this represented a drastic change in IBM's previous relationship with the companies.

The products of many of the companies invited to the Poughkeepsie meeting have direct competitors among IBM's own software offerings.

IBM's software has, however,

long been regarded as inefficient. Some observers have said this is to be expected of a non-software specialist, but IBM has often been accused of deliberately producing resource-consuming software in order to sell more hardware.

With users becoming more critical of software performance, an increasing number of IBM sites are turning to independent systems software and utilities.

A report by US financial analyst Morgan Stanley last year maintained that, if it were not for the availability of independent software products, IBM's hardware sales would be seriously reduced (CW, August 5, 1976).

It now appears that IBM agrees with this assessment and recognises that it is in its own interest to keep its software "competitors" up to date on likely developments.

No comment could be obtained from IBM on the

reasons for the Poughkeepsie meeting, or on the prospect of a similar meeting in the UK for this country's software producers.

Other hardware manufacturers have been somewhat ahead of IBM in recognising the potential of independent software, and several have taken this to its logical conclusion by taking on and supporting the independent product as its own standard software.

Outstanding examples come from the world of databases, with the adoption of Cullinane's IDMS as well as CDC and Honeywell's use of Cincom's Total.

It will be interesting to see whether IBM's new rapprochement with the independent software companies eventually leads it along the same path.

## UK release for Dax

The console software developed by IBM DOS machines by SDI under the name Dax (CW, June 23) has been officially announced in the UK. Dax covers several functions — the printing of console messages relevant to a certain job on the end of that job's line printed listing; spooling of console output; and support of one or more IBM 3277 displays as consoles.

These functions have been taken on separately by most UK users; but at least two companies, unit trust manager Sava and Prosper and motor dealers J. W. Hawley, are considering use of the complete package.

## Chiswick gets a window into KPG

COINCIDING with its announcement of a new software/hardware product, systems house KPG has extended its premises to two separate sites. The new office — in Chiswick, West London — will house its programming staff, and will include, for the first time, a computer room visible from the street, exhibiting a variety of equipment.

Initially, the Chiswick offices will house 30 staff. The existing offices in nearby Brentford, will continue as the head office and

sales base. The move is planned as an initial step in a long-term expansion program.

One of the systems on show in Chiswick will be the new product, Solitaire. It is claimed to be the first single user accounting and business management system to be based on a microprocessor.

The basic set of Solitaire software covers purchase, sales and nominal ledgers, cash-flow analysis, invoice production, payroll, order processing and stock control.

Software for other functions including solicitors' time recording and incomplete record management for accountants, is also available.

The Solitaire hardware includes an unnamed make of processor, visual display terminal, printer and floppy discs. The configuration is priced at under £10,000, including one suite of software. Extra software is chargeable.

## Facilities management pact

A "SOFTWARE" "facilities management" agreement has been concluded between Safe Computing and the Birmid Qualicat foundry. The Safe consultancy will handle all future software development and maintenance for Birmid, and has taken on seven of the company's software staff.

This novel type of arrangement could become increasingly adopted, the companies predict. It offers the customer a team with wide-ranging software experience, gives the staff greater job satisfaction and could provide an outlet for any generally applicable software developed, they contended.

As of September there's just one way to reach the booming computer markets of Western Europe...

COMPUTER PRODUCTS

COMPUTER PRODUCTS

A COMPUTER WEEKLY PUBLICATION

My company supplies computer equipment/software products/services to computer users and I would like to find out how COMPUTER PRODUCTS INTERNATIONAL can help me to reach a wider market.

Please send me a copy of the Computer Products International brochure containing media details and information about the European computer market.

I am responsible for placing advertising on behalf of my company

Signature

NAME

JOB TITLE

COMPANY NAME & ADDRESS

COUNTRY

Handwritten signature: J. W. Hawley

Produced by the same team which has made Computer Weekly International Europe's most widely read computer newspaper, COMPUTER PRODUCTS INTERNATIONAL will bring news of the latest hardware and software products, whatever their country of origin, to an audience of 50,000 computer executives throughout Europe.

At least 50% of every issue will consist of product information, but there'll also be a News Review, an OEM page, and a product survey — in September, low-cost VDUs.

All these plus factors will stimulate reader interest and ensure that copies of COMPUTER PRODUCTS INTERNATIONAL are retained for further reference. That's why we call CPI "a product journal plus".

To find out how these plus factors can be made to work for you, the advertiser, and how you can reach the largest international audience at the lowest cost, clip the coupon and send it to John Godley, Advertisement Manager, Computer Products International, Dorset House, Stamford Street, London SE1 England.

## CDI data dictionary seminar

A SEMINAR on a topic of expanding interest, data dictionaries, will be run by Control Data Institute in London, on August 16. The event aims to give DP management an appreciation of the value of a data dictionary in keeping track of its database or as conventional files.

The seminar will include discussion of the data dictionary

concept in general, examination of specific products and advice on implementation strategy. Speaker will be Bernard Plagan of DBD Systems Inc, a consultant specialising in database, data dictionaries and on-line systems development.

Venue for the seminar is the Gloucester Hotel, London, SW7. Cost will be £38 including lunch and literature.

## Pafec suite enhanced

THE finite elements structural analysis suite, Pafec, as implemented by the Cybernet Time Sharing bureau, has been enhanced with the provision of several new shapes of elements, allowing closer approximation of the shape and properties of

complex structures. The Pafec suite was developed by a team at Nottingham University which, last year, formed itself into a company, Pafec Ltd, Cybernet is the only commercial bureau to offer the suite.







## PEOPLE

### UK vice-president for Calcomp

FIRST Calcomp vice-president to be appointed outside the US is Brian Higgins, who becomes vice-president for European operations. As in his previous job as European regional manager, he is responsible for an area stretching from Scandinavia to North Africa and which includes subsidiaries in the UK, Holland, Germany, France and Italy. Higgins joined Calcomp from De La Rue Ball - GE in 1987 to set up Calcomp Ltd. He became European regional manager in 1973, and at the same time was appointed chairman of the UK company.

At Calcomp's Anaheim, California HQ, Paul Sackendorf, previously vice-president, corporate planning, has been named corporate vice-president, international division.

Mervyn Farrant and Jeremy Robinson are the joint managing directors of K3 Software Services, Kalamazoo's newly-formed subsidiary. Besides software services, K3 will offer a consultancy service to potential buyers in the mini and small computer field. Farrant was previously Midlands branch manager with Burroughs, and Robinson was Burroughs' Midlands regional systems manager.

John Hony has become managing director of Memory Business Machines, a company within the Memory Ireland group. His previous positions include that of general manager of Robert Wilson (Ireland), director of the Aer Lingus catering subsidiary, and NCO and adviser to Nigerian Airlines and Guinness Peat Aviation.

### Soccer

ONLY three matches have been played in the Summer Computer League this week, and the most significant result was in division three, where Altago beat the leader, 3M and went top. The game ended 3M's chances of winning the division, as the team has now played all its matches, but the situation at the top is very tight. Control Oats, in fourth place, still has to play ICL, which is third.

Latest results:  
Division 1  
Southwest 6, Computing O  
Division 2  
Computer Weekly 6, Estel O  
Division 3  
Altago 4, 3M 1

Top division three:  
Urgo 6 4 2 0 34 11 10  
IM 8 4 1 3 27 17 9  
CL 5 4 0 1 18 7 8  
Control 5 3 1 1 22 13 7

Would teams please note that any Birmingham telephone number has changed to 01-240 223.

### TUC Youth Award goes to Apex man

AN outstanding young trade unionist, Roy Leeming, of Apex, the Association of Professional, Executive, Clerical and Computer Staffs, has been chosen to receive this year's TUC Youth Award.

Leeming works in administration with the British Aircraft Corp in Preston, Lancs. Besides being an active member of the local Labour party, he is branch delegate to the North-West area council of his union and delegate to the North-West Area Engineering Advisory Council, the Preston and District Trades Council and the Preston and District Confederation of Shipbuilding and Engineering Unions.

Ron Elsenhauer, until recently UK sales manager with Digital Equipment, has returned to America. He is replaced at Digital by David Buckingham, whose job as Central and South-West UK district manager is taken by Bill Passmore.

The chain of promotions is completed by Terry Ford, who becomes North European regional manager for the laboratory and education markets in place of Passmore. Ford was formerly Reading branch manager.

Charles Arkabauer has been appointed general manager of European operations with National Semiconductor. He replaces Jack Jordan, who takes on the new post of group director of international marketing at the company's Californian HQ. Arkabauer was formerly general manager of National Semiconductor, Japan.

Brian Gatte becomes marketing executive with Kins Applied Technology, which is a member of the W. S. Atkins group. Formerly he was marketing manager of Digimatics.



Roy Leeming

Frank Fish, until recently European vice-president of Mathematica Products Group, the New Jersey-based consultancy, is transferring to the Princeton, New Jersey HQ to become vice-president of international operations. Tony Royall has been promoted from area manager to manager of UK operations.

Graham Palmer has been appointed an associate director of CMG Computer Management Group UK. He has been an associate director of several CMG subsidiaries in succession, most recently with CMG City of London.

Karl Erdik, vice-president of Comtech Life, Montreal is moving to Toronto to become vice-president and general manager of Comtech's small business systems division.

Comtech Ireland has a new managing director, Ron Zambonini, and the following managers have been appointed: Robert Kidney, technical programming manager, and William Luttrell, systems project manager, both from Data Data Processing, and Pat Hession, systems project manager, previously with UCC Datacom.

Brendan McElhill, hitherto European marketing executive with Computer Automation's Naked Mini division, has been promoted to European marketing manager.

Ken Woods, general manager of Parr Computer Services, has been made a director of the company.

### DIARY

AUGUST 6-12  
IFIP Congress 77/Exhibition 77/Media 77, International Federation for Information Processing, Toronto, Canada.

AUGUST 16-18  
Operational data security workshop, University of Kentucky, The City University, London EC1.

AUGUST 21-26  
Law of the world conference, World Peace through Law Centre, Manila, Philippines.

SEPTEMBER 6-9  
Comcon 77 - micros, minis and mainframes, Washington, DC.

SEPTEMBER 14-15  
Digital processing of signals in communications - conference, IERE, Loughborough.

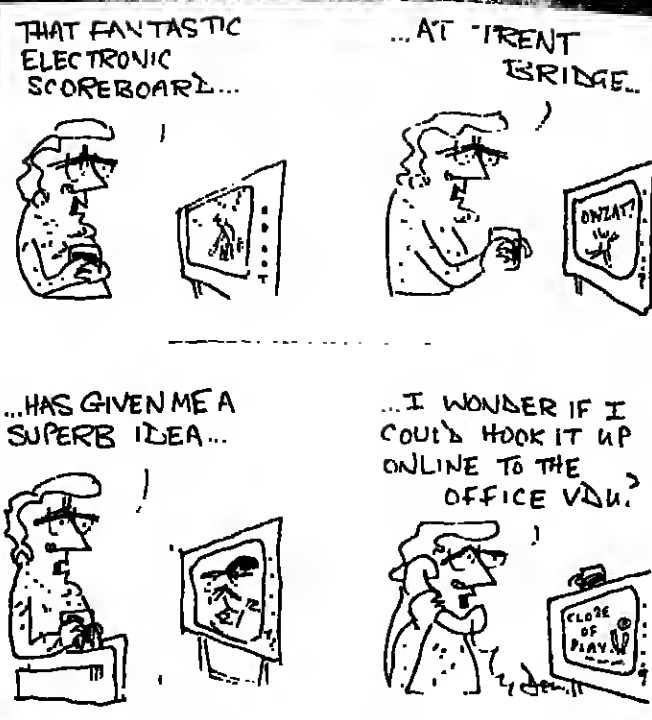
SEPTEMBER 14-15  
Symposium on data analysis and information, Institut de Recherche d'Informatique et d'Automatique, Rocquencourt, France.

SEPTEMBER 18-22  
Society for Management Information Systems, annual conference, Dallas, USA.

SEPTEMBER 18-22  
OSMS, SUITE 2028, 221 North LaSalle Street, Chicago, Ill 60601, USA.

SEPTEMBER 18-22  
Applications of numerical software conference, Institute of Mathematics and its Applications, Southend, University of Essex, Brighton.

## Liveware File by Don



## COMPUTER WEEKLY

The following special supplements are due to be published during AUGUST/SEPTEMBER

DISTRIBUTED COMPUTING FEATURE August 11th

Computing in the 1990s - what does it mean? This special feature will look at the future of computing and the role of the computer in the 1990s. It will also look at the role of the computer in the 1990s.

COMPUTING AND THE ACCOUNTANT August 18th

In most companies the accounts department has been the last to adopt the computer. This special feature will look at the role of the computer in the accounts department and the role of the accountant in the 1990s.

INTERNATIONAL EDITION + BONUS CIRCULATION SICOB PREVIEW September 8th

In September, Computer Weekly will launch its International Edition, a new publication which will provide a comprehensive overview of the computer industry in the 1990s.

Computer Weekly will also launch its Bonus Circulation, a new publication which will provide a comprehensive overview of the computer industry in the 1990s.

Computer Weekly will also launch its Bonus Circulation, a new publication which will provide a comprehensive overview of the computer industry in the 1990s.

Computer Weekly will also launch its Bonus Circulation, a new publication which will provide a comprehensive overview of the computer industry in the 1990s.

Computer Weekly will also launch its Bonus Circulation, a new publication which will provide a comprehensive overview of the computer industry in the 1990s.

Computer Weekly will also launch its Bonus Circulation, a new publication which will provide a comprehensive overview of the computer industry in the 1990s.

Computer Weekly will also launch its Bonus Circulation, a new publication which will provide a comprehensive overview of the computer industry in the 1990s.

Computer Weekly will also launch its Bonus Circulation, a new publication which will provide a comprehensive overview of the computer industry in the 1990s.

Computer Weekly will also launch its Bonus Circulation, a new publication which will provide a comprehensive overview of the computer industry in the 1990s.

## MICROPROCESSORS

Gene Amdahl, father of the 360 mainframe and big machine challenger to IBM, recently said, "Microprocessors are the most revolutionary development in the computer field in my lifetime." That summarised the feeling of most commentators on the computer/information technology scene.

The ultimate impact of that revolution, however, is still little more than intelligent guesswork, for as Computer Weekly's new microprocessor correspondent Martin Banks says in the first article to this microprocessor supplement, micros will take DP into areas where existing systems cannot venture.

Banks looks at some of the ways in which micros could break new ground. On pages 12 and 13 Martin Healey and Alex d'Agapeyeff relate micro developments to small business systems and commercial DP departments, and on page 14 freelance journalist and DIY computer enthusiast Quentin Scott

# Going where no computer has been before...

By Martin Banks

NOBODY can deny that the microprocessor is one of the most significant semiconductor developments in recent years.

The way in which the micro will be used, however, is still not clear, primarily because the development has two distinct aspects.

Firstly, when the microprocessor is enhanced to a full microcomputer, its main uses will be as a more powerful and cost effective element in traditional DP applications.

But, in its simplest form, microprocessor units (MPUs) will find their way into a wide variety of applications, such as washing machines and motor cars, going where no computer has been before.

To determine where these areas will be, we must first examine the main types of application to which the microprocessor has already been put.

The majority of live systems based on MPUs can be categorised in two major groups: computer-based and electronics-based.

In the former grouping the devices have been used either in a typical computer configuration, such as a minicomputer, in order to extend one or more parameters of its performance, and/or as a replacement for a computer-based system.

In the latter grouping the devices have been used either in a typical computer configuration, such as a minicomputer, in order to extend one or more parameters of its performance, and/or as a replacement for a computer-based system.

In many cases the purchase of a complete minicomputer or the development of a custom-designed electronic control system would be an economic dead-end.

These two user groups have one thing in common: experience and expertise in one of the two main technical disciplines involved in applying the MPU.

The computer-based applications have, by definition, been developed by people skilled in software and systems management. The electronics applications have likewise been created by people knowledgeable in the ways of the microvolt.

Yet these two areas miss a significant section of the total.

In many ways, the problem of communication is the largest single hindrance to the future applications development of the MPU. The device manufacturers and suppliers, well schooled in the ways of the electronics industry in general, now find that they are not reaching the converted, and as a consequence, they often lack the right evangelist touch.

It is therefore possible to predict the need for, and the rise to power of, a new breed of consultants. Their role will be primarily to act as the interface between the hardware (and even software) supplier and a single or related range of industries.

In many industries, manufacturers are beginning to realise that just one device type can, if they themselves have the time, money, expertise and knowledge of a multitude of individual requirements, be designed to meet almost infinite number of applications.

The growth of such consultants would shift from the manufacturers much of the responsibility for applications development, and release them for the work of device development. It is an area of their work that many would be happy to be rid of, for the nature of their products, and the processes employed in their manufacture place them squarely in the low cost/high volume "ballpark".

With the MPU, the volume is not yet high, while unit cost is obliged to remain competitive, and rumblings are beginning to

be heard that the extra costs incurred by the manufacturers for software and systems staff is, at the least, questionable. Additionally, what is true for that other traditional source of electronic devices, the component distributor.

This is not to say that the manufacturers would like to shed all their software staff overnight, for the discipline will certainly be instrumental in many of the technical developments made in microprocessors. Although there will certainly be some development of new software packages to meet the requirements of the MPU, the most important ones will come in monitoring the functions and architecture of the MPU to meet the requirements of the many packages already available.

The refinement of production processes will inevitably lead to marked improvements in the functional density and operational capabilities of the devices. Major manufacturers are already

cause of the improved functional density. The normal result, however, has nearly always been the reverse, an increase in the functional capability of the equipment for the same size.

Memory and interfacing components are the two most obvious areas that directly affect the system designer and user. Memories for the MPU market, rather than for mass memory usage, are an important development area, especially in the field of variable PRIMS.

As the applications of MPU based systems expand, so will the demands put upon them in both performance refinement and pricing. It is possible to foresee improvements in their capacity, and substantial price reductions, as their market expands.

There should also be some improvements to methods of dedicating these devices. In terms of brute semiconductor memory capacity, a considerable increase can also be predicted.

In the interface market, there are probably nearly as many "new" devices as there are applications to use them.

Each change has produced the possibility for considerable size reduction in equipment, if desired, because of improved functional density. The normal result, however, has nearly always been the reverse, an increase in the functional capability of the equipment for the same size.

Wherever they come from, it will be these devices that will be truly worthy of the name microcomputer, for they will have an equivalent processing power to a basic minicomputer, while if configured into a distributed processing system, they will far exceed any cost/function performance/available in current approaches.

Where the MPU is to be applied to direct computing and data-processing business, it will be in the distributed approach that it will find most use.

In this respect it is interesting to note that the MPU appears to be following the traditional path of development in semiconductor technology. Each change has produced the possibility for considerable size reduction in equipment, if desired, be-

cause of the improved functional density. The normal result, however, has nearly always been the reverse, an increase in the functional capability of the equipment for the same size.

Wherever they come from, it will be these devices that will be truly worthy of the name microcomputer, for they will have an equivalent processing power to a basic minicomputer, while if configured into a distributed processing system, they will far exceed any cost/function performance/available in current approaches.

Where the MPU is to be applied to direct computing and data-processing business, it will be in the distributed approach that it will find most use.

In this respect it is interesting to note that the MPU appears to be following the traditional path of development in semiconductor technology. Each change has produced the possibility for considerable size reduction in equipment, if desired, be-

cause of the improved functional density. The normal result, however, has nearly always been the reverse, an increase in the functional capability of the equipment for the same size.

Wherever they come from, it will be these devices that will be truly worthy of the name microcomputer, for they will have an equivalent processing power to a basic minicomputer, while if configured into a distributed processing system, they will far exceed any cost/function performance/available in current approaches.

Where the MPU is to be applied to direct computing and data-processing business, it will be in the distributed approach that it will find most use.

In this respect it is interesting to note that the MPU appears to be following the traditional path of development in semiconductor technology. Each change has produced the possibility for considerable size reduction in equipment, if desired, be-



This week the author of this article, Martin Banks, joins Computer Weekly to report on the way microprocessors are affecting the computer business.

Banks has been in technical journalism for about 10 years. He was news editor of Design Electronics in the early 70s and subsequently worked on Electronics Weekly.

Prior to joining Computer Weekly, Banks was deputy editor of Electronic Equipment News.

Early improvements in this situation can be expected to the form of moves towards standardisation by the manufacturers, although two other solutions are possible in the longer term.

The first could well be based on uncommitted circuit approach, where a standardised circuit configuration is produced in volume. To meet a particular interface requirement, a circuit is then taken for one final process step - the deposition of an interconnection pattern to connect the device.

The other possibility is the development of a "universal" interface, perhaps itself based on a simple MPU.

Each change has produced the possibility for considerable size reduction in equipment, if desired, because of improved functional density. The normal result, however, has nearly always been the reverse, an increase in the functional capability of the equipment for the same size.

Wherever they come from, it will be these devices that will be truly worthy of the name microcomputer, for they will have an equivalent processing power to a basic minicomputer, while if configured into a distributed processing system, they will far exceed any cost/function performance/available in current approaches.

Where the MPU is to be applied to direct computing and data-processing business, it will be in the distributed approach that it will find most use.

In this respect it is interesting to note that the MPU appears to be following the traditional path of development in semiconductor technology. Each change has produced the possibility for considerable size reduction in equipment, if desired, be-

cause of the improved functional density. The normal result, however, has nearly always been the reverse, an increase in the functional capability of the equipment for the same size.

Wherever they come from, it will be these devices that will be truly worthy of the name microcomputer, for they will have an equivalent processing power to a basic minicomputer, while if configured into a distributed processing system, they will far exceed any cost/function performance/available in current approaches.

Where the MPU is to be applied to direct computing and data-processing business, it will be in the distributed approach that it will find most use.

In this respect it is interesting to note that the MPU appears to be following the traditional path of development in semiconductor technology. Each change has produced the possibility for considerable size reduction in equipment, if desired, be-

cause of the improved functional density. The normal result, however, has nearly always been the reverse, an increase in the functional capability of the equipment for the same size.

Wherever they come from, it will be these devices that will be truly worthy of the name microcomputer, for they will have an equivalent processing power to a basic minicomputer, while if configured into a distributed processing system, they will far exceed any cost/function performance/available in current approaches.

Where the MPU is to be applied to direct computing and data-processing business, it will be in the distributed approach that it will find most use.

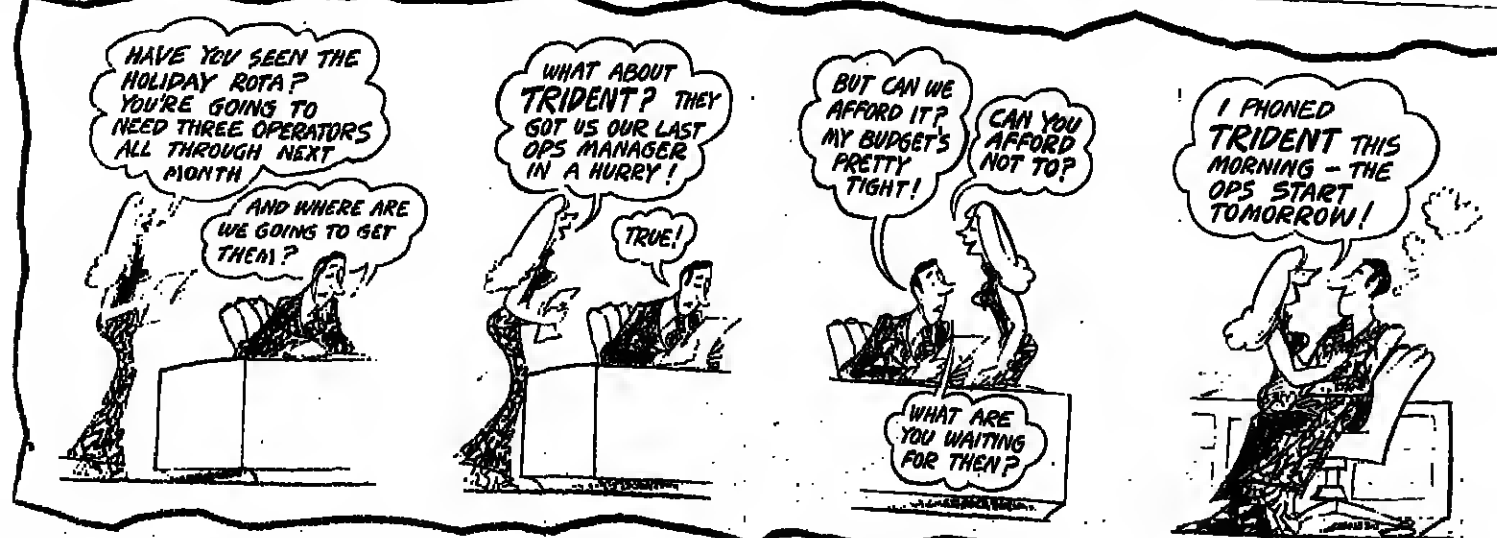
In this respect it is interesting to note that the MPU appears to be following the traditional path of development in semiconductor technology. Each change has produced the possibility for considerable size reduction in equipment, if desired, be-

cause of the improved functional density. The normal result, however, has nearly always been the reverse, an increase in the functional capability of the equipment for the same size.

Wherever they come from, it will be these devices that will be truly worthy of the name microcomputer, for they will have an equivalent processing power to a basic minicomputer, while if configured into a distributed processing system, they will far exceed any cost/function performance/available in current approaches.

Where the MPU is to be applied to direct computing and data-processing business, it will be in the distributed approach that it will find most use.

In this respect it is interesting to note that the MPU appears to be following the traditional path of development in semiconductor technology. Each change has produced the possibility for considerable size reduction in equipment, if desired, be-



## Don't delay! go to Trident straight away!

Trident Computer Services Ltd, 110 Frimley Road, Camberley, Surrey, GU10 2JH. Tel: 0276 64252. Telex No 858386.

## We build systems ... not computers

Suddenly, the promised microprocessor revolution is with us. Applications are now possible that would have been uneconomic even a year or so ago. As Woolworth's have found, they chose Data Logic to develop a new concept in stock management for their major high street shops. The microprocessor used is expected to achieve significant operational savings. A microcomputer system would have been considerably more expensive. Use of a mainframe-based network was quite out of the question.

Computer solutions like these are Data Logic's business. We study the feasibility of automating existing or proposed procedures. We design and implement total computer systems. We translate the promise of advanced computer technology into practical, working systems. Economic systems saving our clients' needs.

Data Logic builds systems ... not computers. So we can choose the most suitable machine for every situation. And when we think a computer solution is wrong we say so. Like to know more? Call Steve Feldman on 01-578 9111.

Data Logic Limited, Westway House, 320 Rutland Road East, Greenford, Middlesex UB8 9BH

**DATA LOGIC**  
the total capability computer company

**Trident** The Contract and Permanent Placement Specialists  
Licensed by the Department of Employment as an Employment Agency and Employment Business

20, 2000 (UK) 20,000





An example of a successful micro-based business system is this installation at Farnham Housing, of Farnham, Surrey. Supplied by Compelec Electronics, the £8,000 system uses an Altair 8800, based on an Intel 8080, and includes a Boroc IQ 120 VDU for input and file updating, and a Castronics 700 printer for output. Applications include invoicing, sales ledger and stock control. Customer files and other data are stored on floppy discs with a total capacity of 800K.

# Scene is set for 'cowboys' to move in

By Martin Healey

THE data processing industry needs little in-depth knowledge of microprocessors. The main impact of advances in LSI technology will materialise in cheaper, more flexible and generally better variants of the traditional tools.

The microprocessor is simply an electronic component. New minicomputers are already constructed around the more sophisticated bit-slice microprocessors, while most feature microprocessors in interface and

controllers. Multiple-processor systems, either clustered or distributed, will replace bigger computers, as the microprocessor materialises as a new form of computer. The major impact for the DP industry will be the changes in management techniques and the increased range of work that can be done.

Software for microprocessors is, after a slow start, also improving, with extensive use of cross-software products, and a number of stand-alone systems have been developed, complete with peripherals, which support operating systems, compilers and other utilities.

This development of micro-based systems has been one of the driving forces behind the growth of the small business systems market.

Possibly the Digital Equipment 310, based on a PDP 8, not a microprocessor, showed the way with a reasonable disc OS and an excellent new language, DIBOL, with resident compiler. This line continues with the LSI-11 microprocessor-based PDP 11/03.

Other systems, designed as intelligent online terminals, have all the requirements of small business systems, eg Datapoint 2200 and Jacquard J100. Both are based on microprocessors, the former a special version of the 8080, more like the Z80, and the latter on a 16-bit National Semiconductor multi-chip microprocessor.

All these configurations feature operating systems which, for small processors, are remarkably advanced. All use high level languages and even offer multi-programming. Equally important, they are upgraded to multi-terminal hard-disc based systems.

Probably the most important development to date, however, is the advent in the US of the do-it-yourself computer, led by the MITS Altair 8080 system.

This is a remarkably well engineered computer which supports a disc-based Basic system. Indeed the 8080-based system marketed by Intel is said to use similar software.

With a printer, VDU, twin floppies and 32K byte memory, a DEC DIBOL system costs about £15,000, while an Altair costs about £8,000.

What then is the catch? There is not one really, but there is a lot of room for manoeuvre in which many innocent end users are going to get hurt.

There are two problems to using the DIY systems, maintenance and applications programs. The former is not a serious worry because cards are cheap enough to make plug-in maintenance practical and it is certain that the independent maintenance companies will be looking to these machines as a good source of business.

The situation with applications is rather worrying. With hardware prices down to VRC levels, the unsuspecting end user is expecting the £500 touch from software as with the VRC. However, the disc system having provided enhanced capabilities, also requires more complex programs to use them.

The increased versatility



Martin Healey, who is senior lecturer in the Electrical and Electronic Engineering Department at University College, Cardiff, says that it is to be hoped DP professionals will quickly gain a working knowledge of microprocessors so that they can realise the potential and the pitfalls — and confront the real business of processing data.

means that A doesn't really want what B wants, which is the inherent weakness of all packaged solutions. Somebody supplying the computer must spend time specifying the user's requirements, which costs money.

The real facts are that the applications software for a £8,000 floppy disc system is almost as expensive as for a £25,000 mini-based system.

Indeed it may be worse, since a turnkey system supplier is looking to an OEM discount to contribute to his income. From a DIY system this income would be much lower.

Thus the scene is set for the industry 'cowboys' to move in. Since a machine like the Altair uses Basic, accounting packages are available. These will be sold cheaply to a gullible user who will then find that after-sales support is non-existent.

Further software development will then have to be contracted to a software house which will prove expensive since there is no OEM hardware income and it is most unlikely that the 'package' will include any documentation.

One final point to make here is that the DIY machine is suitable for programming the enthusiast, so that many executives of small companies are doing it themselves.

Remember, however, that applications programming is more about system analysis and design, file structures, coding procedures, etc, than coding.

It is to be hoped that DP professionals will quickly gain a working knowledge of microprocessors so that they can realise the potential and the pitfalls and confront the real business of processing data.

# Impact of micros on DP department

By Alex d'Agapeyeff

GROSCHE'S LAW, as everyone knows, stated that the power of a computer was proportional to the square of its cost. It was this law which provided the intellectual justification for the big machines widely employed in data processing. The corollary was the centralisation of processing, the dominant position of the DP department and one snag that is not too widely discussed: central processing encourages very large programs in which most of the coding is only there because the programs are so large.

Large, central processes must be kept running continuously, must embrace an enormous number of exceptional cases and must utilise the configuration with tolerable efficiency. The doing of all these things requires yet more code in the systems software as well as the application programs. One might postulate that there is another and more important law to the effect that the complexity of a program is proportional to the cube of its length, due to the interrelationships arising from the code. It would seem that the excessive number of programs constantly assigned to the care and maintenance of existing programs is evidence of this law.

The remarkable achievement of micros is that they have not only negated Groscche's Law but actually reversed it for certain purposes. It is possible to assemble a microcomputer from the latest, large scale integrated circuits to carry out simple arithmetic far more cheaply than on an IBM 380/16K. DP is more difficult because of the problem of handling bulk data. Existing, single processor microcomputers with floppy discs can be classified as minis but they are often half the cost of a traditional, small, minicomputer. However, machines made up from multiple processing elements can be made very powerful and yet be of comparatively low cost.

The IBM Series 1 may well prove to be the forerunner of a quite different kind of machine. It has a powerful instruction set that is an improvement on some mainframes. Its control processor is based on fast microcircuits. It can be readily coupled to a variety of peripherals through I/O interfaces which are themselves processor boards. Although it is not sold as such it could be regarded as a rather attractive alternative to conventional, mainframe computers.

The future role of micros is, nevertheless, entirely independent of the potential replacement of conventional computers. This point is of obvious concern to DP departments but the outcome is inevitable: only the timing is uncertain.

The real importance of micros rests upon the fact that both processor and memory circuits have become units of mass production. Some peripherals are also moving in the same direction. The effect is that the cost of these devices is more related to the volume of production than to their content. Thus a processor circuit can be bought for less than \$10 and Shugart have a multiple, if small, disc system for less than

\$600. At the same time the content of these circuits, that is their level of integration, is increasing at a furious pace. For example, Texas Instruments have a circuit of roughly 100,000 bits enabling them to offer a terminal with up to 80,000 bytes of storage.

CAP MicroSoft has estimated that by the end of 1980 there should be over a million reprogrammable processors in Western Europe. The big areas of usage will include small business machines, text processing, telecommunications, machine tools and home TV units linked to both Teletext and Videotext but with a general purpose computing capability.

By 1980, therefore, most clerical offices, however small, will have some kind of processor based equipment. The same applies to each section of most factories. Who is going to plan, organise and buy these processors? Who is going to program them? Indeed, how are they to be programmed when the population of reprogrammable processors is more than five times the number of professional programmers?

Minis tend to die hard. Some DP managers refuse to believe that other departments may go ahead and buy their own computers. "It would lead to chaos," they often say, perhaps with justification, but in my experience few DP departments actually know how many processors are already installed in their organisation. Once a group of, say, engineers get into the habit of ordering and programming their own computers they seldom see any point in going to the DP department for help.

Nonetheless, the opportunity for DP remains. The proliferation of micros should lead to a corporate responsibility, by someone, for guiding their exploitation. There are also good grounds for centralising the training and even the conduct of kernel programming regardless of the area of application.

If the opportunity is to be grasped it must centre on the quality of the service provided. This may involve less emphasis on processing but more on programming. These programs must be shorter, simpler and cheaper. Fortunately, this is more practicable now that processing efficiency is less vital with low cost machines.

The first thing to be acknowledged is that, given a free choice, users would rather write their own programs without analysts and programmers as intermediaries. Fortunately, for those of us in the business their choice is not free. Without training the amateur programmer cannot write serious programs. However, he or she can use command languages, declarations and so forth to provide local variations on top of a suitable kernel produced by the professionals. This is done quite widely with Mark IV and is the only apparent path which could keep program maintenance within reasonable bounds.

The question is how long these kernel systems be written for the variety of small, processor configurations that will be acquired. For example, CAP has 18 computers installed on its

premises or due for early delivery of which 12 have their own distinct instruction sets. Within two years these figures could double. Clearly it is not practicable to re-write common applications for each instruction set in use. Moreover, many of the smaller configurations, such as a microcomputer board connected to a floppy disc and VDU, are not themselves suitable for program development.

The solution lies with what are called host development systems that are equipped with genuinely portable programming languages. For instance, a

number of companies will be buying, presumably, lots of Series 1 which will include very small configurations for, say, controlling air-conditioning, security surveillance and for local ledger work. In such a company a wise DP department will obtain a large model Series 1 for developing, at least, the kernel programs on all the others.

The same DP department may then find it would be helpful if that host system could also be used for developing programs for non-IBM processors. This has not yet been done for the

Series 1 but that is only a matter of time. Tektronix have a universal host system based on the Millennium computer which is aimed at engineering applications and CAP has done the same on the PDP-11 for DP applications. Any host can be equipped with a language that is interpreted on the target systems in a way that will ensure portability. Several universities have done this with the language BCPL and now CAP has done the same with MicroCobol.

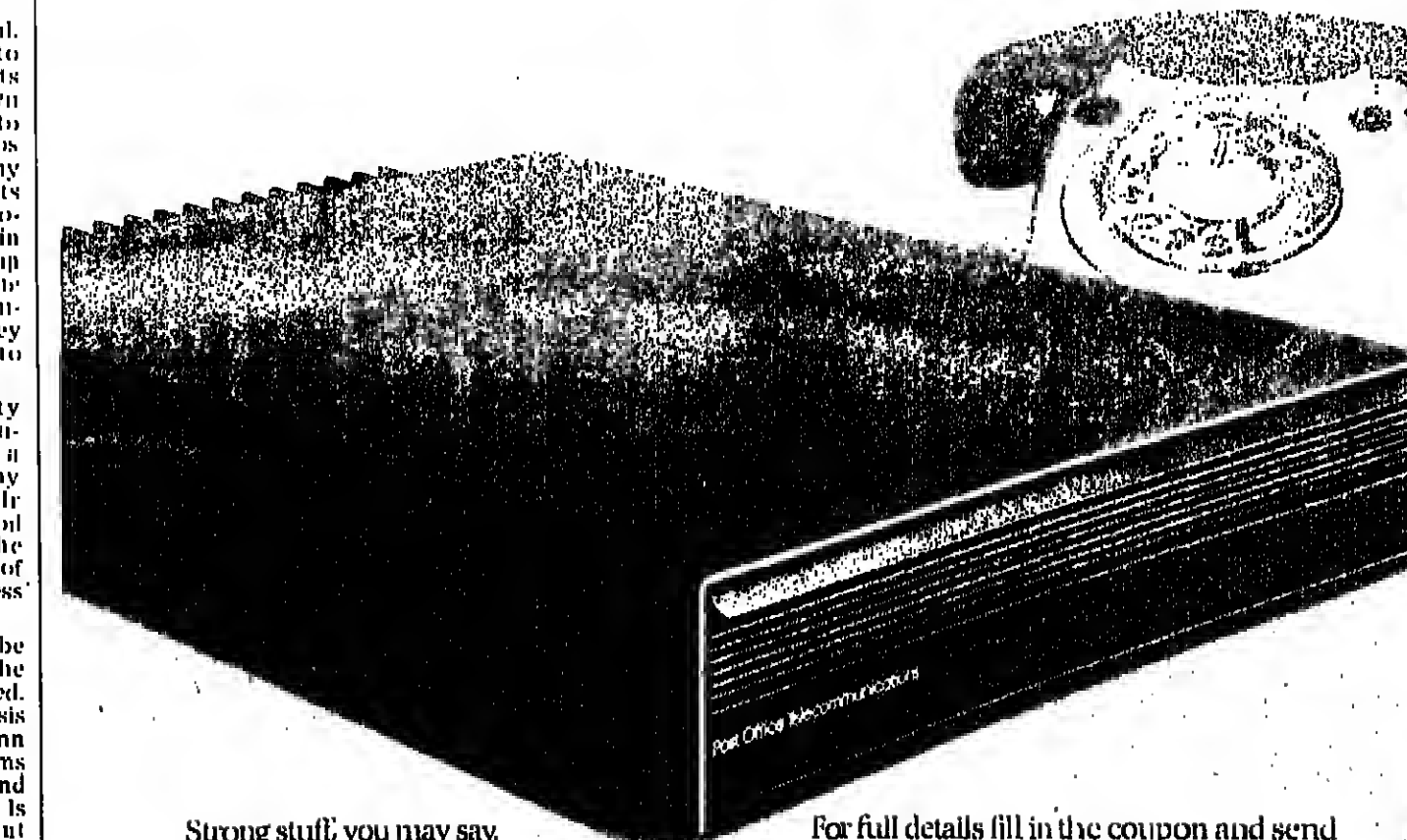
Programming then can be the key to the future opportunities for DP departments.



Alex d'Agapeyeff is chairman and managing director of the CAP-PPP Group, which was founded in 1962 and now retains over 800 professional staff throughout Western Europe and the Middle East. Former president of the British Computer Society and member of ARC's Computing Science Committee and the Computing Systems and Electronics Requirements Board, d'Agapeyeff is chairman of CAP MicroSoft, the group's new subsidiary developing software tools and products for microcomputers in addition to a general service for users of these devices.

## The New Datel 2412

We can justifiably claim that it's twice as good as any other data transmission system.



Strong stuff, you may say. But supportable.

Because only Datel 2412 offers a 2400 bit/s service on both private circuits and the inland public switched telephone network.

Something no other system may offer. And that's not its only advantage.

It has test facilities to help you with your own service routines and fault location.

It conforms to C.C.I.T.T. recommendations V25, V26, V26 bis and V28.

The modem takes up only 0.37 cubic feet of your valuable space.

And last but by no means least, maintenance support (which can operate around the clock) is on call from 61 Telephone Areas across the country. This is built into the rental — a thing you don't get from all other suppliers.

Post Office Telecommunications

For full details fill in the coupon and send off freepost to the address below (no stamp required). If you are also interested in operating at 2400 bit/s to overseas countries, please tick box below.

To: Alan Miller, Post Office Telecommunications, Product Management - Datel Services (TMR 4.2.1), Freepost, London EC2B 2TX.

NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_  
POSITION IN COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
POSTCODE \_\_\_\_\_ TELENO. \_\_\_\_\_  
☐ Overseas operation

Where to help you

We microprocessors are changing the face of the electronic and computer industry, allowing existing products to be more powerful and efficient and opening up new application areas in industry and the home.

MICROPROCESSORS is a new bi-monthly technical journal, international in outlook, covering hardware, software and applications of microprocessors and microcomputers.

Each issue contains informative technical articles, product and literature reviews, comparison charts, an educational feature plus other regular sections.

MICROPROCESSORS is published alternate months, the annual subscription, 6 issues, is £23.00 UK, £31.00 overseas. For further details and a subscription form please complete and return the coupon

TO: MICROPROCESSORS  
IPC Science and Technology Press Limited,  
IPC House, 32 High Street,  
Guildford, Surrey, GU1 3EW, England  
Telephone: 0483-71661. Telex: SciTec Gd. 859556

Please send further details and subscription form I would like to see a sample copy ☐

Name \_\_\_\_\_  
Organization and Address \_\_\_\_\_



## MICROPROCESSORS

# Risks of designing your own board

By Quentin Scott

I FOUND a computer hobbyist friend recently, stuck in his "sitting" room with a 40-pin dual in-line package microprocessor in one hand, and a pair of long-nosed pliers in the other.

He was engaged in an activity rather like the Gardener's painting of the Queen of Hearts' roses in Alice: he was bending the pins to fit into a socket too small for the part. Around him, among the mess of wires, test meters, transformers, puddles of solder, disassembled TV sets and unwashed plates in multiplexed heaps, were another nine identical printed circuit boards to the one on which he was trying to squeeze his microprocessor.

The point of this story is that if you design your own board, you risk finding that nothing plugs into it.

You also risk finding that it plugs into nothing, which can be a lot more serious — unless you are IBM, in which case it's what you are trying to achieve.

In the case of my friend, the problem was caused by the camera on the board printing equipment, which reduced his blueprints by marginally too

much. He could get most of the 18-pin components into their sockets, because the total shrinkage was not too much across the shorter length of these devices. But the big microprocessor was a whole pin out of step at each end.

For reasons not unconnected with the deplorable scene I have described above, manufacturers of microprocessor components have found it helpful to their customers to design standard printed circuit cards.

The resulting "single board computers" do save the user from designing his own boards and getting it wrong, and they are very reasonably priced compared with the cost of the parts in them. Their disadvantage is that they are too complex, since they have to be designed for all likely applications: they tend to have far too many I/O lines, too sophisticated interfacing, and too much memory, for any particular one.

But their main disadvantage is that no manufacturer makes the same system. Each manufacturer, on the contrary, makes more than one.

For example, Intel provides software development people with the Intel Micro Development System (MDS) — a minicomputer which uses the 8080 as its CPU. It also provides the SBC 80 series of single board computers, which are aimed at OEM customers who do not want to design their own boards. But you can't take the CPU card out of the MDS and use it in a system designed round the SBC 80 cards, because they do not fit into all the same sockets.

But at Motorola, everything is designed around the Exorciser bus — quite a nice family of boards and development boards, all of which will plug into the Exorciser (Motorola's equivalent of the MDS) and run.

Motorola's partner in building the 6800, AMI, has developed its own series of development and appraisal boards. They use the identical microprocessor, built from the same masks and the same fabrication process "recipe" — but they are completely incompatible at board level.

At Texas Instruments, the "development system" is a minicomputer called the 990/4 —

due to be replaced by a development system that does not have half the output lines tied to the front panel and half the I/Os tied into the monitor.

But the OEM board is a double Eurocard device. And there is an American card system under final development, which promises to be different from either.

Let us look away from the microprocessor makers, and into the hobbyist's IBM, MITS, which built the Altair. The Altair 8800 computer kit uses a hundred-pin bus, called the SIOQ, which has been widely hailed as the first industry standard to evolve which benefited the user.

What happened was simple: MITS designed the bus around the 8080 microprocessor, and sold so many kits that other people began making add-on boards that fit on the same bus.

Then other kit manufacturers, spotting the Altair kits had some spare profit margins, produced Altair-compatible computers which undersold, but shared the benefits of the 8800 kit — i.e., super-cheap add-on boards from lots of people.

US hobby supplier James St John of MicroLogic, recently summed up his reasons for using the Altair-bus-compatible (ABC) concept — in a letter to the magazine Klobaud — as "grudging".

"First, he points out, if the Altair 8800 uses the Altair bus, then what does the Altair 880 (based on Motorola's 6800 micro) use? The Intel and Altair

CPUs, widely regarded as identical (and Intel sells its equipment as such) "differ on their generation and use of signals such as PRESST and PUL" says St John; and adds: "None of the Zilog boards presently available will run all existing ABC memories and peripherals — or software, contrary to claims."

A lot of these changes are essential, given the advanced nature of the Zilog CPU and the relatively primitive nature of the 8080. St John tactfully refers to the "limitations inherent in a bus structure which is intrinsically tied to the 8080 CPU" — which is the same thing.

Things do not end there with the ABC concept: apart from some engineering inadequacies such as "positive true" rather than "negative true" structure — a debatable fault — the next big problem looming is "what do we do with 16 bit micros?"

Intel, which is making its own 10-bit micro (the 8086), thinks the solution is to use its own SBC 80 bus structure. There is, however, no publicly available information about the SBC80.

The question does not arise, yet, mainly because of cost. Not only is the SBC bus designed to sell into a market that provides a much better profit margin than the hobby market, but also, it has a large number of edge-connectors.

And providing a simple 100-pin Eurocard square pin socket for a system can be expensive. Looking down the list of buses, one starts with the simple

Manufacturers of microprocessor components have found it helpful to their customers to design standard printed circuit cards, rather than sell a bagful of semiconductor chips with general specifications on how they fit together.

The resulting single board computers, writes Quentin Scott, save the user from designing his own boards and getting it wrong.

HP or ILL or DEC three-wire handshake control bus (it's available on the PET computer from Commodore/MOS Technology right through CAMAC) which has built a 6800 system round a subset of this) to the IBM channel concept.

None of these is ideal for any application. The one bus which might find universal acceptance is the Unibus from DEC, and DEC has patented that. In the meantime, the larger the micros are about, the more software grows up around these buses, the harder they are to change.

The problem is worse than serious. A DEC system house building its office system around the DEC Unibus and RSTS operating system could find it difficult to adjust to RMX in any of its versions, and is therefore incapable of using the LSI 11, which does not run RSTS.

In spite of this, I hear people talking happily about providing bus adapters, to convert from their own to the ABC concept, for example — as if it would be so easy.

If the same bus is not operating system compatible, what chance do we have with micros (which do all their own I/O) on different buses? Especially when microprocessors seem to be totally ignorant of software, never mind structured programs with device handlers... yes, I know that is a gross injustice to many, but not to the majority.

## Circuit complexity could double each year

THE history of the microprocessor begins with the achievement of memory semiconductor fabrication through the metal-oxide-semiconductor process (MOS) in 1960 — a chip containing 256 bits of RAM. In 1971, and 1972, Intel marketed the first microprocessors, the 4004 and the 8008 — a 4 bit and 8 bit CPU respectively.

The immense potential represented by MOS for chip density caused Gordon Moore of Intel to suggest that circuit complexity would double each year up to 1980, and then every two years. RAM chips of 64K are already expected at about the beginning of 1978. LSI also offers greater reliability through a fewer chips solution and, in most cases, decreased costs through volume production.

Bipolar technology is also used to produce microprocessors and offers higher speeds than MOS chips but the latter's higher circuit density makes it currently preferable for many microprocessor applications. A possible bipolar alternative under development is integrated injection Logic (I<sup>2</sup>L) which is capable of combining bipolar speed with MOS density.

The original microprocessors were based on a PMOS technology that employed a negative electron flow. Currently, NMOS utilising a positive electron flow is becoming increasingly popular, even though it is apparently a somewhat more difficult process. Its advantages primarily lie in that the finished microprocessor is capable of around three times the speeds it would achieve under the other method.

Bipolar bit-charge microprocessors could also grow from a currently small share of the total market to around 20% by 1985. Their current disadvantages are said to be higher costs due to the necessary components and the need for an extensive memory capacity. Their advantages are the capability of designing substantially more powerful assemblies than are possible with MOS, together with their basic compatibility with existing TTL (transistor-transistor logic) circuit packages.

The initial costs should be offset by capability and reliability, leaving only the difficulty that it is relatively unknown in the industry.

Another MOS technology known as complementary MOS (CMOS) achieves high speeds and low power consumption, by combining PMOS and NMOS transistors to form an integrated circuit. Although this process is more expensive at present, it still has a wide appeal among industrial users because of its power savings. The quiescent power consumption of CMOS, for example, has been estimated at 1/10<sup>th</sup> that of a similar TTL.

EPROM and RAM memory units are expected to become increasingly utilised, at least in the industrial and computer markets where greater flexibility and facilities for data storage will be an important consideration in systems design. MOS RAMs with their higher densities will probably dominate the bipolar counterparts in many industrial uses where speed is not crucial, as opposed to the computer mainframe area, where this is not so.

At present, there are two main MOS RAM technologies — static and dynamic. The first utilises a flip-flop switch and the latter a semiconductor capacitor for their memory cells. Magnetic bubble memories are under development and are considered likely to be feasible within four to five years.

Unlike the majority of current RAM units, bubble memories will be non-volatile (retain data) and are memory through power disruption. One estimate expected to be for cheaper, one-bit cells, suggesting possible costs of down to about 100 millifarads per bit compared to about 100 millifarads per bit for dynamic RAMs which are currently the cheapest to produce. Bubble memories are expected to be extremely high, ranging up to 250K.

Brian Beckett

## Appointments

LONDON: Brian Beckett, 01-261 8484  
MANCHESTER: Owen Kelly, 061-872 4211  
BIRMINGHAM: Alan Scott, 021-358 4838  
GLASGOW: Owen Kelly, 061-872 4211  
BRISTOL: Alan Scott, 021-358 4838  
LONDON: Steven Basingthwaite, 01-261 6174  
MICHAEL WHITE: Classified Advertisement Manager, 01-261 8028/8658

Altergo Business Systems Limited is EXPANDING

## UK & ABROAD

System/3 RPGII System/32 Analysts and Programmers

Due to an exciting and continuing period of growth we are looking for a number of **experienced computer professionals** to complement and enhance our existing team.

We are part of the Altergo Group of Companies that has gained an international reputation for its approach and application to requirements.

If you possess **RPGII** in depth, **System/3** or **32** experience, and have the ability to project yourself to fellow professionals, then **Brian Walker** or **Barry Whitesman** would like to hear from you — NOW.

A highly competitive salary, plus fringe benefits befitting a large Company are offered to the right people.

**altergo**

Altergo Business Systems Limited  
Warwick House,  
38 Soho Square,  
London W1V 5DF 01-734 9681

## Seismic Programmers OIL/GAS EXPLORATION

To develop and maintain new and existing software for processing seismic data, using both Fortran and Assembler. Two Texas Instruments (TI) 1100 systems in our Head Office are dedicated entirely to seismic processing and our programmers work in close liaison with the geophysicists who use the systems.

We are seeking people with at least two years' programming experience, preferably with a seismic system, who have used both Fortran and Assembler on the smaller type of computer. Knowledge and experience of seismic techniques would be an advantage. For one of the posts substantially greater specialised experience is required. Candidates, 24-34, should have a degree or equivalent in Mathematics, Physics or Computer Science.

Starting salary will be commensurate with age and experience. First class fringe benefits include subsidised lunches, full private and social facilities and non-contributory pension scheme.

Please write giving brief details of age, qualifications and experience, quoting reference PY 415, to: The Manager, Central Recruitment, The British Petroleum Company Limited, Britannic House, Moode Lane, London EC2Y 9BU.

YORKSHIRE REGIONAL HEALTH AUTHORITY COMPUTER CENTRE, VICTORIA AVENUE, HARROGATE  
**BASIC PROGRAMMER**

SCALE £3153 to £4038 per annum including supplements. Applicants from outside the NHS normally start at the minimum. The Authority's Computer Centre operates an ICL 1800A 128K Computer, 8 1800C tapes, 8 E0580 discs on two controls, card and paper tape input, 2 printers and 2 ICL 7020 terminals. The post is with an installation currently engaged on financial, medical, community health and statistical applications together with an experimental project involving the use of terminals.

A minimum of 1-2 years' experience is required of programming for the 1800 series machine in PLAN/COBOL. Programming involvement will be throughout the full range of applications and 'experience' of E05/GEORGE 3 Operating System would be an advantage. Application form and job description from Regional Personnel Office, 5A11 Yorkshire Regional Health Authority, Park Parade, Harrogate HG1 5AH. Closing date: 12 August 1977. Tel. Harrogate (0423) 85081, Extension 240.

LOTHIAN HEALTH BOARD NORTH LOTHIAN DISTRICT

Applications are invited for the post of

**SYSTEMS PROGRAMMER**

for duties in the Departments of CLINICAL CHEMISTRY and SURGICAL NEUROLOGY at the Western General Hospital, Edinburgh. Applications with copies of two references to Dr. D. S. Mann, Western General Hospital, Edinburgh EH4 2XU (Tel. 031-352 2828) by 12.00.77. Please quote Ref. P210.

## Contact Knights For Contracts

### Operators

If you have at least 2 1/2 years' operating experience, you may be interested in one of the following immediate contracts.

ICL System 4 Ops  
ICL George III Ops  
ICL George II Ops  
IBM OS VS1 Ops  
Terminal Ops  
Tape Librarians  
Data Control Ops  
DOS/Grasp/Power Ops

United Kingdom & Abroad  
Kent and Berks  
Leeds and Sussex  
Kent  
London  
Kent and London  
London

For further details call Sue, Pat or June—NOW! on 01-491 4706.

**Knights**

### Programmers

**LONDON**  
IBM - 370 DOS/VS COBOL - SYSTEM 3  
UNIVAC - EX-EC 8 COBOL - 2903 RPGII/COBOL - 1900 GII COBOL - DIBOL/FORTRAN  
**SOUTH**  
IBM - 370 PLI with TSO/JCL EXP.  
ICL - GII, PL/I + DRIVER, GII COBOL PROGRAMMERS.  
- 2900 EXPERTS, TECHNICAL WRITERS, 1904 GII FORTRAN, HEVLETT  
PACKARD - PROGRAMMER

**NORTH**  
IBM - 370 OS COBOL PROGRAMMERS.  
ICL - GII MACROWRITERS.  
For fuller details of the top contracts around, ring Richard Kaluzynsky or Mike Holden on 01-491 4706.

**Knights**

## Your future is bright at Knights

AMSTERDAM  
100,000 Guilders p.a.

### PERMANENT POSITIONS

If you're a programmer, systems programmer, systems analyst or operator with over 2 1/2 years' experience your future could be brighter at Knight.

We have one of Europe's largest software and operating teams, so we attract bigger, and more, assignments. So you benefit.

For a wider choice of the better opportunities around pick up that phone and ring James Plummer right now, or complete the coupon below.

**Knights**

## Overseas

### EUROPE

IBM OS/370 Writers required for long-term contract in LUZERN/CHURCH, commencing September 1977. A serious advantage.

### W. GERMANY

Systems Programmer required with IBM 8080 exp. ICL (and possibly Assembler) 12 month contract.

### HOLLAND

Responsible ICL 1900 GII + operator for 1903T installation, also able to operate 1903T GII + emulations on 2960. Minimum 4 months' duration from 1st August.

### ITALY

PDP programmer with assembler required for 6 months. Message switching or communications an advantage. Top rates + tax concessions.

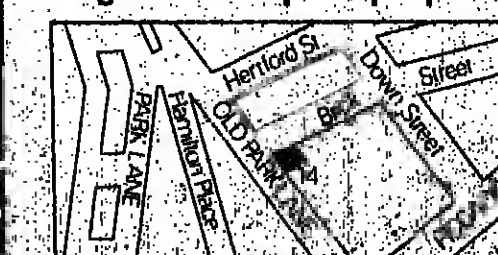
**Knights**

Ring 01-491 4706

For a greater opportunity either in contract work or in a permanent career, send off this coupon now.

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Tel: home \_\_\_\_\_  
Tel: work \_\_\_\_\_ Ext. \_\_\_\_\_  
Area pref. \_\_\_\_\_  
Number of years' experience in:  
Operating ☐ Programming ☐  
Analysis ☐ M/C & Lang ☐  
Salary required \_\_\_\_\_  
Position req. PERMANENT ☐ CONTRACT ☐

Knights—fits computer people to computer problems perfectly



**Knights**  
Knights Computer Services Limited  
14 Old Park Lane, London W1V 1NL

**01-491 4706**  
24 hour answer phone

## Sicob PARIS

291,919 visitors from 110 different countries studied Data Processing and Office Equipment exhibited by 1,711 firms from 29 countries at Sicob 1976.

What about you?

You will be going to the 28th

**Sicob®**

held from September 21st to 30th, 1977

and to the Convention Informatique (Data Processing Convention) from September 19th to 23rd, 1977 (In 1976, 2,150 people attended 150 conferences and Round Tables)

For further information:  
French Trade Exhibitions, 196 Sloane Street,  
LONDON S.W.1. Tel. 235.3234 - 235.3235.



We have an immediate requirement for the following staff:-

## ANALYST/PROGRAMMERS

Starting Salaries of not less than £4,800 + Profit Sharing + BUPA + Pension.

## SENIOR PROGRAMMERS

Starting Salaries of not less than £4,400 + Profit Sharing + BUPA + Pension.

## PROGRAMMERS

Starting Salaries of not less than £3,800 + Profit Sharing + BUPA + Pension.

THE ABOVE SALARIES COULD BE CONSIDERABLY MORE DEPENDENT UPON YOUR EXPERIENCE AND ABILITY.

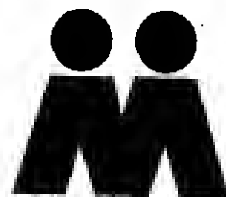
Currently we have requirements for experience in all these levels for:

- IBM COBOL and/or ASSEMBLER under OS
- ICL 1900 COBOL and PLAN
- ICL System 4 COBOL and USERCODE
- HONEYWELL COBOL under OS 2000
- UNIVAC 9030 and 1100 range

We currently have assignments both in the U.K. and abroad and therefore opportunities exist for staff to work in a variety of overseas locations in addition to this country.

Ring 01-903 4901

and talk to either Rod Evans (Director of Personnel) or John Birch (Head of Development)



### MOUCEY AND PARTNERS

Kingsbridge — Wembley — Manchester  
Germany — France — Austria — Switzerland  
Sweden — USA — Brazil

### SUMMER SNAPS

#### Systems Consultants £6,000-£9,500

CENTRAL LONDON

Seven large well-established consultancies wish to recruit systems people with all-round experience on third generation equipment and the right personality to deal with clients who require a first rate service. Technical communications consultants are also required where in-depth implementation experience of IBM or ICL T/P message switching networks etc. are essential. Excellent fringe benefits and prospects CW 31/1 Michael

#### Junior Programmers £2,500-£3,750

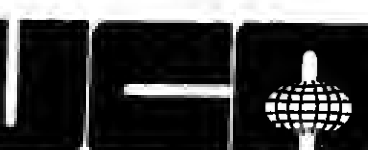
LONDON, HOME COUNTIES

Only one year's experience? Then you are in great demand. We have a large selection of first-rate companies who need people like you. CW 31/2 Annette

#### Operators to Shift Leaders £2,000-£4,000 (incl.)

LONDON & HOME COUNTIES

We have many vacancies covering all types of machines and locations. Some firms will train from one manufacturer to another. Remember these positions are for shift working only. Hurry whilst stocks last. CW 31/3 Annette



DATA EXPRESS HOUSE  
PROSPECT PLACE  
HEATHFIELD TERRACE  
CHISWICK W4 3BR

Recruitment Consultants  
01-958 8138

#### Contract Programmers to £190 p.w.

U.K.

Immediate requirements for IBM COBOL under DOS or IMS for U.K. London, PL, T OS or CICS, PLP, PL or good IMS for various locations for 3 months plus. Also IBM vacancies in GERMANY, FRANCE, BELGIUM & ITALY. Ask for the Contracts Officer on 01-995 2235 CW 31/4 Michael

#### Successful Salesmen to £12K quota earnings

U.K.

We now have two different lines for both hardware and systems only companies who are anxious to meet successful salesmen in this industry. They must have previous relevant small systems experience (some VRCS will be considered). All firms have bonus schemes and cars or car allowance. Must positions in S.E. England but 2 in Midlands CW 31/5 Michael

#### Mini Computer Programmers to £5,950

U.K.

Your experience is required now. A very large number of vacancies are reported where a knowledge of Assembler or communications experience is essential (VRCS programmers would also be considered). Opportunities exist in S.W., N.W. or W. London, Surrey, Herts, and Manchester in this exciting and rewarding field. There has also been registered some overseas posts to people with 5 or more years in mini computers CW 31/6 Michael

#### Time Sharing Programmers to £6,000

C. LONDON

If you have had time sharing experience involving the use of FORTRAN, BASIC, or ASSEMBLER, then we have four nationally known companies who would offer you an exciting job in pre- or post-sales support. Some offer generous bonus schemes. CW 31/7 Michael

### MIDLAND OPPORTUNITIES

**Analyst/Programmer - Birmingham** £3K-£6K  
A major manufacturing firm requires Analysts and Programmers with experience on IBM machines plus at least 18 months experience in PL/1 or Assembler.

**Analyst/Programmer - Coventry** £3K-£6K  
A software house requires Analysts and Programmers with experience on IBM PL/1 language in PL/1 language using ICL, ICL, PL/1 or PL/1.

**Programmer - North Birmingham** £4K  
A subsidiary of a major property company requires Analysts with at least 18 months experience using ICL and ICL/PL/1 language on experience would be an advantage.

For details telephone  
021-224 1111

ATA Selection & Management Services  
102 New Street  
Birmingham  
B2 4JG

### SHIFT LEADER

(Ref. M86)  
Salary Range: £3,780-£4,035 p.w.  
Inclusive plus 14% shift allowance  
(Communications Manager, data-view, main-mop)

Lambeth Computer Centre have a highly successful computer installation which currently operates on ICL 1903T and 1902A computers and includes a 32K 7803 front end processor. The computers are operated under GIL.

In addition to its manual batch processing which covers two shifts, the installation supports an extensive communications system utilising ICL 7181, 7802 and 8700 terminals.

We are looking for a mature person to lead a small team of operators. Ability to motivate and experience in operating still and scheduling work is of prime importance. He/she should have experience of the ICL 1900 Series Computer and a knowledge of GIL and communications. A minimum qualification of 5 years is essential.

The two shifts operated are from 8.00 a.m. to 3.30 p.m. to 10.30 p.m., for which allowance of 14% is payable.

The computer is housed in a pleasant, bright and airy Centre within easy reach of railway, bus and car. Canteen facilities available. Help may be given in agreed cases with removal costs. Season ticket loan scheme in operation.

Application forms are obtainable from the Personnel & Recruitment Office, Directorate of Management Services, London Borough of Lambeth, 12 Porden Road, Brixton Hill, London SW2 6SE. Tel: 01-274 7722, Ext. 146.

Closing date: 18th August 1977

**LAMBETH**

### OPPORTUNITIES IN R.P.G. II

## WATFORD, HERTS PROGRAMMER & ANALYST PROGRAMMER C £6,000

Our client is a major international manufacturer of customised industrial components, with offices in the U.S.A., Europe and Great Britain.

Prior to installing a new 64K f.8.M. System 3, Model 12, they are currently seeking to recruit a Programmer and an Analyst-Programmer to assist with the implementation of the new machine, due for delivery at the beginning of next year.

ANALYST-PROGRAMMER will report directly to the Data Processing Manager, and will be responsible for implementing an order-entry system, production control systems and various financial systems, all running under R.P.G. II.

PROGRAMMER with at least one year's meaningful experience of R.P.G. II, the successful applicant will assume a large degree of responsibility for the programming work and can expect to work closely with the Analyst on the new systems being implemented.

As these are new appointments, in a new department, the prospects within the company are limitless. Foreign travel is also envisaged at a later date.

INTERESTED? THEN RING DEREK WREAY ON 01-439 6299 TO DISCUSS THE POSITIONS FURTHER.

### THE IDEAL MARRIAGE !!

## COBOL PROGRAMMING & COMMUNICATIONS LONDON W.1 SAL. C £4,500

Our client, one of the world's largest British owned Engineering and contracting organisations, serving oil petro-chemical process and metal industries throughout the world, currently seeks to recruit a small specialist programming team.

The successful applicants will initially play a major role in the redevelopment of an American accountancy system based on a remote site UNIVAC 1100/21 using an On-line VDU cluster for programme development.

DON'T DELAY!

Ring Colin Hush on 01-439 6299 (reverse charge) for further details

### Computer Appointments Register

## OPERATORS IBM 370/158 M.P. LONDON/WEST OF LONDON £3,700-£4,200

A leading Bureau is in the process of setting up a new Data Centre in the West of London to complement their established Central London Data Centre.

Their requirement is for experienced operational staff.

The successful applicants will have at least one year's operating experience on large IBM equipment supported by OS or VS operating systems. A knowledge of teleprocessing and JCL/utilities would be an advantage.

If you are interested then contact William Glasswell on 01-439 6299, quoting Ref. No. W.G. 736.

### Computer Appointments Register

## EXCEPTIONAL PROGRAMMERS GREATER LONDON £5,500 + Travel

Do you think that you are ready for a move into the lucrative and demanding consultancy field?

Our clients are a leading and expansion-orientated software house, looking for programmers with the flair and ability to fulfil their client's insatiable needs for consultants, with the experience and know-how to help them solve their day-to-day problems.

If you have a thorough understanding of large mainframe machines, plus a good working knowledge of any one of the following: Cobol, Assembler or PL/1, then you have just the position for you.

The total remuneration package carries a top-level salary, profit-sharing and generous travelling expenses.

If you are a professional, then this is the job for you.

Ring Derek Wreay on 01-439 6299 for an informal discussion.

### Computer Appointments Register

**FREELANCE  
5-MONTH (MIN.) CONTRACT  
Commercial Software Programming  
in R.P.G. II  
Wembley; start S.A.P.  
to £165 p.w.  
Telephone: Colin J. Hush 439-6299**

## Computer Appointments Register

Regent House, 54-62 Regent Street, London W1A 4YL Tel: 01 439 6299 a member of The Federation of Personnel Services

### Computer Appointments Register

### Computer Appointments Register

### Computer Appointments Register

### Computer Appointments Register

### Computer Appointments Register

## SYSTEMS PROGRAMMERS IBM 370/158 M.P. CENTRAL LONDON/WEST OF LONDON TO £6,000

Our client, one of Europe's leading Computer Services Centres, is setting up a new installation in the West of London. They have a requirement for Systems Programmers with a strong system bias, to be based either at their office in Central London or at the new site. Applicants should have a minimum of 3 years' experience with a wide IP experience (software and hardware) and will be involved in problem solving, enhancements and future planning (including SNA/VTAM/PL/1). Currently we utilise the following software: ICAM, BIAM, RTAM and 3705 EI.

A Systems Programmer is also required to develop and update operational procedures, and provide a link between systems programming and operations. The successful applicant will currently be a Systems Programmer or a Systems Operator with technical offline responsibilities.

If you are interested then contact William Glasswell on 01-439 6299 quoting Ref. No. W.G. 785.

## MOVE ON TO THE 2900 RANGE LONDON SYSTEMS/ANALYST C £5,000

Our client is one of Europe's leading retailers of quality footwear. They have a requirement for a systems/analyst to work on their present machine, a Burroughs 8735, and subsequently to assist in the transition to an ICL 2900. Applicants in their mid-20's should have spent at least 2 years in a commercial environment engaged in programming and systems work. The successful applicant will be involved in major conversion projects, and the design and implementation of new systems.

Situated in an exclusive part of London, the company offers an attractive salary, plus benefits. If you are interested in this exciting opportunity, then contact William Glasswell on 01-439 6299, quoting Ref. No. WG 733.

## A UNIQUE OPPORTUNITY TO GO ON-LINE PLAN OR ASSEMBLY LEVEL C £5,000

**HERTS**  
The information services division of a leading organisation urgently seeks to recruit an experienced Analyst/Programmer who will play an important role in the development of on-line systems, one of which is for the inter-plant exchange of data.

This is an excellent opportunity for someone with approximately 2 years' plus experience in Data Processing. Preferably using PLAN to move into an environment which is geared towards operating at the forefront of Systems Technology within its field.

The successful applicant will receive an attractive salary and generous fringe benefits which include flexible working and the possibility of first-class accommodation locally.

If you are interested in progressing in this exciting field, ring John Faragher on 01-439 6299 (reverse charge) quoting Ref. J.F. 726.

### CITY OF BIRMINGHAM POLYTECHNIC

The following vacancies exist in the Computer Centre which operates on ICL 1902S (32K) running under GEORGE 2 and MAXIMOP.

#### SYSTEMS ANALYST (S.O.1)

£4239-£4849 + £312 + 8%  
A person with substantial data processing experience is required. A good knowledge of programming is essential and experience in an educational environment desirable.

#### CHIEF PROGRAMMER (A.P.5)

£3826-£4695 + £312 + 8%  
Required for Systems Analysis, Programming, etc. Applicants should have a high degree of motivation, ability to work with the minimum supervision, and be capable of supervising a small programming team.

Further particulars and application forms to be returned by the 18th August, 1977 from: The Personnel Officer, City of Birmingham Polytechnic, F. Block, Perry Barr, Birmingham B42 2SU. Tel: 021-358 6911. Ext. 218.

## Systems Analyst

The Crown Agents are an independent public organisation operating as financial, professional and commercial agents for overseas governments, public authorities and international bodies.

The computer division is located at Sutton in Surrey and a Honeywell Level 86/05 is on order for delivery early next year to replace the 2 Honeywell 1200 series computers currently installed.

A systems analyst is required to take part in the design of a major new system for order processing and accounting which will require advanced file structures and extensive on-line facilities. Candidates should have at least 4 years' experience of programming and systems design, which should include on-line systems. Knowledge of Honeywell I/O and TOS would be an advantage. Starting salary will be negotiable up to £6,000.

For full details and application form telephone 011 222-7730, ext. 3514, or write quoting MP/748/CO, to:

**Crown Agents**  
The Crown Agents for Overseas Governments and Administrations, Appointments Division,  
4 Millbank, London SW1P 3JQ

### IBM OPERATIONAL VACANCIES

Machine	Shifts	Experience	Area	Salary
IBM 360	3 Shift System	TRAINER	E.C.4	£1800
IBM 370/DS	DAYS ONLY	18 months +	W.1	£3000
IBM 370/145/148	3 Shift System	1 year +	Surrey	£3132
IBM 370/DS/V81	3 Shift System	18 months	Herts	£3300
IBM 370/135/DS/V81	3 Shift System	2 years	Middlesex	£3500
IBM 360/50/DS/DRASP/POWER	4 Shift System	3 years +	E.C.1	£3600
IBM 370/DS	2 Shift System	2 years	E.C.3	£3800
IBM 370/125	3 Shift System	Shift Leader	E.9	£3700
IBM 370/DS/V81	3 Shift System	Sen. Operator	N.W.1	£4000

### ICL OPERATIONAL VACANCIES

Machine	Shifts	Experience	Area	Salary
ICL 1902A	S. No W/E	Jr. Operator	W.C.1	£2700
ICL 1902A/Geo. II	2 Shift System	18 months +	Surrey	£3000
ICL 1904/Geo. II	2 Shift System	18 months	E.C.2	£3300
ICL 1804A/Geo. II	4 Shift System	1-2 years	E.C.1	£3300
ICL 1900/Geo. II	DAYS ONLY	2 years +	S.W.1	£3400
ICL 1802S/Geo. II/II+	2 Shift System	Sen. Operator	S.W.5	£3780
ICL 1904/Geo. II	DAYS ONLY	Chief Operator	E.C.2	£4000
ICL Systems 4	3 Shift System	2 years +	Middlesex	to £4100

### MISCELLANEOUS OPERATIONAL VACANCIES

Machine	Shifts	Experience	Area	Salary
Surrogate 3600/8700	12 hour shifts	1 year +	W.1	£2800 +
Surrogate 1700	2 Shift System	to 1 year	S.E.1	to £3000
Daleport 2200	DAYS ONLY	Sen. Operator	E.C.2	£3500
Olivetti D.E. 523/521	DAYS ONLY	1 year +	N.W.1	£3000

Above are just a selection of vacancies we have available

**ajk Recruitment Limited**  
26 Chisworth Street  
Paddington, W.2  
01-402 0933/8

**ajk**



# Project Leader

International Bank

**Salary: c. £7,000 plus bonus and normal bank fringe benefits**

Have you a strong computer banking systems background?  
Are you working in an environment that limits your potential?  
Would you like to work on on-line computer banking systems at a very early stage of development which can offer you significant experience?

If you answer yes to these three statements you probably would like to meet our client who is a very well known and established International Bank with offices throughout Europe and North America. Their computer systems group is well regarded and highly successful.

They now wish to bring in a computer banking specialist to act as Project Leader on a very important stage of the development of their new systems. Ideally you will have been in banking systems for between

three and four years in an on-line environment, will enjoy working on your own and will feel that you have a significant amount to contribute from your past experience. You will certainly gain more experience by working in this exciting environment. This is a job for someone who really can get things done, does not mind hard work and wants to make a genuine move upwards in his or her career.

If you are interested, please contact John Goldsmith. Ref. 669



John Goldsmith (Computer Recruitment) Limited  
15 Buckingham Palace Road, London SW1. Telephone 01-828 5356. 24-hour answering service

**JOHN GOLDSMITH** (Computer Recruitment) Ltd.

## We are looking for experienced Analysts & Programmers

The Sangers Group has a turnover of £80+ million with interests in pharmaceutical, photographic and grocery distribution.

Data Processing has a key role to play in the Group's projected growth over the next five years. Our Computer Centre is based in Huntingdon with 2 IBM 370/136's supporting 64 VDU's. In addition we have recently taken delivery of an IBM 3790 for use by our Northern Ireland subsidiary. The possibilities of Distributed Processing and on-line program development are under investigation for the future.

To help meet this challenge we require the following personnel:

### Senior Systems Analyst— To £6000 Huntingdon

You must have the proven ability to make a major contribution to the design of an integrated system based on a distributed network. You should have at least 3 years experience of systems analysis, design and implementation in a commercial environment.

### Systems Analyst—Belfast To £5000

Based in Belfast, you will be closely involved with the Northern Ireland users in the design and implementation of locally based systems on the IBM 3790. This is an ideal opening in business systems analysis for someone with 2 years programming experience including involvement in Systems Design.

Career progression with the Company is based on ability and is linked to a planned personnel development programme. Generous relocation assistance will be provided where appropriate. If you enjoy working to high standards in a stimulating environment then contact:

Barry Townsend, Systems Development Manager



**THE SANGERS GROUP LIMITED**

Grammar School Walk, Huntingdon PE18 6NY. Telephone No. Huntingdon 57481.

### Analyst/Programmer—Huntingdon To £5000

This is an opportunity to move into systems analysis by working on smaller systems from initial design stage through to final implementation. You must have had 2 years COBOL programming experience and been involved in systems design.

### Programmer—Huntingdon To £4250

We are looking for a young COBOL programmer with at least 1 years experience (preferably IBM DOS VS). Knowledge of BAL would be useful. You will have the opportunity of progressing into analysis, software programming or senior commercial programming.

**JBA**

### PL/1 Programmers

UK & Europe up to £7000+  
Our client, one of the largest international software houses in Europe, has opportunities for programmers with experience of PL/1 on IBM OS systems, to work on the development of commercial applications.  
The positions, although based in London, offer the chance to work in various locations both in this country and on the Continent. Candidates should have at least two years in PL/1 (or a combination of PL/1, ASSEMBLER or COBOL) in a commercial environment. Competitive salaries and excellent allowances.  
Contact: Margaret Stevens

### Senior Programmers/ Programmers

Herts. to £5500  
Our client, a well established computer manufacturer, has a long-standing reputation in the areas of advanced satellite/RJE telecommunications and is currently involved in a number of developments including distributed processing, using micro processor technology. To assist in the development of these projects they require experienced programmers who have a sound background in basic software. This should include experience of networks, RJE, remote terminals and assembler level programming. Some knowledge of ALGOL/CORAL would be advantageous. An excellent opportunity for the d.p. professional.  
Contact: Margaret Stevens

### Technical Authors & Engineers

Attractive opportunities in many parts of the country  
Contact: Mike Creamer

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

**JAMES BAKER ASSOCIATES**  
International Personnel Consultants  
16 Maddox Street, London W.1. Tel: 01-491 4478

### Software Specialists

Berkshire c. £6500  
Our client, a leading software house, has vacancies for designers and programmers to work on the development of new software. Candidates must have at least two years' experience in the design & coding of basic software, preferably on compilers or operating systems. Knowledge of emulators, communications or teleprocessing would be an advantage.  
Attractive salaries & large company benefits including relocation assistance.  
Contact: Margaret Stevens

### Software Programmer

Scotland c. £5600  
A well known international company, manufacturing a highly successful product, seek an experienced software programmer with a background on IBM 370 under OS/VS1 and preferably advanced RJE facilities. Required languages are COBOL and ASSEMBLER. The system is used for a wide variety of company and management services, so knowledge of IMS and DL/1 is highly desirable. Attractiveness of surrounding countryside is only surpassed by company benefits, prospects, and total relocation expenses.  
Contact: Mike Creamer

### BASIC+ Programmer

Berks up to £4800  
A well established systems house, specialising in commercial turnkey applications, has a vacancy for a programmer with at least 12 months experience of BASIC+ on PDP11's. Knowledge of RSTS would be a distinct advantage.  
Challenging & professional environment. Excellent salaries.  
Contact: Mike Creamer

## MUNICH GERMANY COMPILER DESIGNERS & MINI-COMPUTER PROGRAMMERS £9K-£12½K

A leading German Software House has requirements for two compiler construction designers and implementors for a sophisticated mini computer. Experience in compiler design for mainframes will, however, definitely be considered. Mini computer systems programmers are also required. Top perks, relocation expenses, etc.

USA  
Data Express House, Prospect Place  
Hastfield Terrace, W4. Tel. 01-896 3803

### Golden Vale Engineering

the largest organisation serving the equipment needs of the dairy, meat, food, brewery and pharmaceutical industries in Ireland. Invites applications for the following career opportunity from suitably qualified candidates.



### PROCESS CONTROL ENGINEER

Required to head up department involved in design, specification analysis, programming and commissioning of relay and computer based logic systems for routing and control of dairy and related liquid food pipeline and process systems.

Degree or equivalent qualification with substantial experience including familiarity with the relevant languages used in this field essential.

Excellent salary and fringe benefits.  
Apply in confidence to: Personnel Manager,  
**GOLDEN VALE ENGINEERING,**  
Limerick Road,  
Charleville, Co. Cork.

### ANALYSTS AND PROGRAMMERS

The Altergo Group already employs over 200 staff and is currently involved in a number of major projects providing DB/DC, IMS and PL/1 consultancy and applications expertise in the U.K. and overseas.

A number of vacancies exist for experienced systems analysts and programmers who want to work in a demanding and stimulating environment.

### SYSTEMS ANALYSTS

Applicants should have a minimum of 6 years' DP experience (at least 2 years on IBM systems) and be able to demonstrate a distinctive competence in a particular business area, e.g. Stock Control systems. A knowledge of TP or data base techniques would be an advantage. Successful candidates will have the opportunity to progress to the business consultancy team.

### PROGRAMMERS

Applicants must have at least 2 years' experience on IBM systems programming in PL/1 or COBOL. A knowledge of data base or TP techniques would be an asset though not essential as our education division provides regular training courses for our staff in these areas. Vacancies exist at all technical levels from programmer to team leader.

Salaries offered will be commensurate with experience in the range £4000-£6500. We also offer expenses and a bonus scheme.

Please write to or telephone Helen Glick at

**altergo**  
Altergo Limited  
38 Soho Square  
London W1V 5DP  
Telephone: 01-734 8681  
01-646 0070 (after 7 p.m.)

### Teesside Polytechnic HEAD OF THE COMPUTER CENTRE (Grade V)

Applications are invited from qualified Honorary Graduates with substantial computing and managerial experience.

The Centre's present main computer, an ICL 1906E, is due to be replaced shortly by a large new multi-access system, to provide interactive computing facilities to all departments within the Polytechnic, including those operating specialist Undergraduate and Postgraduate courses in computing.

Salary: £7,887 to £8,080 per annum  
Application forms and further particulars from the Stelling Section, Teesside Polytechnic, Middlesbrough, TS1 8DA, Cleveland County.

### Systems Programmer

Our Client, a major national industrial organisation, has an excellent opportunity for a Systems Programmer in a small team based at a modern, well-equipped laboratory in London. The team is responsible for the maintenance of the George 3 operating system running on an ICL 1945 computer, and for the provision of support to research and engineering users throughout the organisation.

Future work will include development of software to allow the connection of non-standard devices to the ICL computer, and the successful candidate will make a significant contribution in this area.

Applicants should have relevant systems programming experience, but considerable will be given to graduates with efficient computing experience. Important attributes are initiative and the ability to work with a minimum of supervision.

Conditions of employment are excellent, offering attractive salaries in a career-graded structure and qualifying for a contributory pension scheme.

Please write in the first instance, enclosing details to the address below. (Reference HQ84) must be quoted on your envelope. Enclose separately a note of any companies to which your application should not be sent.

Ronald Fairbairn, Everett Recruitment,  
10 Graycoat Place, London SW1P 1BP

EVERETT recruitment



## RANK HI FI Systems Analyst

Rank Hi Fi who manufacture the famous Leak and Wharfedale loudspeakers have a vacancy for a Systems Analyst at their company in Idaho, Bradford.

The position requires a person to analyse company requirements and to design both manual and computer based systems to meet these needs. They will also be expected to study existing procedures and recommend improvements.

It is essential that the person appointed has successfully completed a degree course or obtained an equivalent professional qualification. A minimum of 2 years' systems analysis experience and a year or more in the commercial field is also necessary for this post. Tact, patience and the ability to mix with a wide variety of people will be invaluable assets.

Commencing salary for this position will be around £4000, and relocation expenses will be paid, if applicable. Other benefits include free Life and Accident Insurance, Contributory Pension Scheme and discount on Rank Organisation products.

Men and women interested in this position should telephone for an application form to:

Miss J. V. Williamson, Personnel Officer, Rank Hi Fi, Wharfedale Works, Highfield Road, Idaho, Bradford, BD10 5BF. Tel: Bradford 811131, Ext. 301.

## RANK AUDIO VISUAL

## OPERATIONS JOB CONTROL ANALYST

A challenging position for someone interested in progressing with a department which is shortly to install a Century 300 using the 84 operating system incorporating NCR JCL.

The main purpose of the job would be to direct the job control activities of the operations area at our Brent Offices.

Though you should preferably have experience in an NCR multi-programming environment, knowledge of other languages

multi-programming systems would be considered. Full training will be given.

We operate flexible hours system, offering within limits a choice of starting and finishing times. Bonuses are paid bi-annually. A pension/life assurance scheme is in operation.

For further details contact Ted Young, NCR Ltd., 206 Marylebone Road, London NW 6LY. Tel: 01-452 0050.

**NCR**

### PROGRAM FUTURE!

City Cannon Street

£5,000+

Major U.K. Bureau subsidiary of secure banking group are offering outstanding opportunities to young programmers for two new projects about to be launched.

You will be part of a young team. Be encouraged — improve your career prospects working on the latest hardware — developing commercial packages and enjoying a high salary & benefits package which includes: Season ticket, travel allowance, major health and underground insurance, generous lunch allowance, cheap company housing and a 5 year mortgage before a qualifying period. If you have programming experience and are ambitious then call today! Tel: CS 1008.

00 EXECUTIVE (KINGSTON) 01 546 9473

### FREELANCERS

Government Contracts, Government Higher Payments, etc.

If you have experience in any of the following:

IBM OS COBOL  
ICL 1900 COBOL  
HONEYWELL 6000 COBOL

Contact Derek Ayles on 01 402 8155. Mascal Computer Services Ltd., 60 Queens Gardens, W.2

## EWBANK AND PARTNERS LIMITED COMPUTER MANAGER

SALARY CIRCA £4,250 p.a.

We are a progressive company of Consulting Engineers with our Head Office in the centre of Brighton. Our work involves us in major engineering projects both in U.K. and overseas mainly in the fields of power generation, transmission and distribution, dam construction, oil and gas industries including North Sea oil production platforms.

We require a Computer Manager who will be responsible for the day-to-day running of the Company's PDP 11/40 installation. The man or woman must be capable of writing and advising on programmes in at least Fortran and basic. Applicants must also be able to create and maintain the software needed to enable the engineering, word processing and administrative staff to use the facilities in an effective and trouble free manner.

We provide excellent conditions of service with attractive salaries, profit sharing bonus scheme, pension and life assurance, permanent health scheme, lunch vouchers and generous relocation expenses where appropriate.

If you feel that you have the type of experience we are seeking, please send your C.V. to Peter Hessay at Ewbank and Partners Limited, Prudential House, North Street, Brighton, Sussex BN1 1RW. If you require more details or would like an application form telephone him on Brighton (0273) 29731 — reversing the charges.

London Borough of Enfield

Applications are invited for the following vacancies in the Borough Treasurer's Department.

### Senior Systems Analyst

£5494 to £6055 (Post No. 218)

Applicants for this post should have a sound background in programming and systems analysis and some years' experience in Local Government or Commercial Data Processing.

### Senior Systems Analyst

£5494 to £5797 (Post No. 222)

The successful applicant for this post will be responsible for advising and implementing software, in addition to supervising programming standards.

### Programmer

£3694-£4072 (Post No. 225)

Applicants should have at least one year's programming experience preferably with ICL COBOL. The Borough's Computer Installation currently consists of a 84K ICL 1902T and is developing 7502 terminal systems.

Application forms are obtainable upon receipt of a foolscap stamped addressed envelope from the Borough Treasurer, P.O. Box 54, Civic Centre, Silver Street, Enfield, EN1 3XF. The closing date is 18th August, 1977. Reference No. ORA/878 and the post in which you are interested must be quoted in all correspondence.

## A Step into management

### Data-preparation—Wiltshire

Circa £3,750 per annum

If you have a background in operations/data control/data preparations, and are keen to gain management responsibility, and experience, this could be the job for you.

You will have control of a large staff operating a two shift system on C.M.C. 6200 key to disc equipment, plus two card punch machines, and will be expected to achieve excellent throughput to strict time schedules.

Applicants, male or female, should be 25 plus, preferably have experience of controlling staff, and be prepared for hard work and rewarding prospects.

Book club associates, jointly owned by W. H. Smith and Doubleday of New York, is the leading book club organisation in the U.K., and is growing fast, we are situated in Swindon, Wiltshire. In a modern office block within easy reach of beautiful surrounding countryside, there are the normal range of large company fringe benefits.

Please apply with brief details of experience to:

**bc**

Senior Personnel Officer  
W. H. Smith and Son Ltd.  
Greenbridge Industrial Estate  
Greenbridge Road, Swindon,  
Wiltshire, SN3 3LD  
Tel. Swindon 36271, Ext. 327

### APPLICATIONS/SYSTEMS PROGRAMMER

IBM Cobol Assembler PL/1 or RPG II  
Data M. COBOL — VLS ON CDM's  
TOTAL: All types of Systems (Mainframe)  
Language Ability: Excellent  
Salary: £3700 - £5700 senior  
Cobol and JCL

### EDP AUDITOR/PROGRAMMER/DESIGNER

Must Computer Programming experience or involvement as an EDP Auditor in a Finance Account or Cost Accounting Environment for one year's contract. Free Accommodation and Holiday Leave

### COMMUNICATIONS PROGRAMMERS AND DESIGNERS

PDP 11 Data General Nova, Texas Instruments, IBM 370 Series ICL 2800 (New Range), Burroughs 2700

Applicants who feel they meet the above specifications should contact by telephone or letter or if they prefer visit our office below.

**MALLA TECHNICAL SOFTWARE LTD.**  
104 BURNLEY ROAD  
LONDON NW10 6JL  
TEL. 01-81-527-2245

104 Burnley Road, Burnley, Lancashire BB10 1JH

## Systems Analyst

Salary up to £5,500  
N. W. Kent

### OUR CLIENT IS

A large international manufacturing company committed to major expansion of TDP systems involving distributed processing, database etc.

### ARE YOU

an analyst of proven ability with a years plus experience of TDP — a "TDP professional" who can communicate at all levels — capable of working on your own initiative.

In addition to the competitive salary the company can offer the successful TDP professional an attractive benefits package.

Please write with full details, quoting Ref. Eps, stating the names of any organisations to whom your letter may not be sent, to: K. Whitfield.

## Whites

Whites Recruitment Limited  
72 Fleet Street, London EC4A 3JS  
Offices: Associates: Amsterdam, Bristol, Brussels, Düsseldorf, Leeds, Manchester and Tel Aviv/Barhampton

## F. W. WOOLWORTH & CO. LTD. COMPUTER OPERATOR

(Scale to £3,500 inclusive of allowances)

Our operations team is looking for an experienced operator to join a well organised group within the company.

We are a large installation using ICL 1900 hardware and operating with GEORGE 2 system. The successful candidate will probably have at least 3 years' 1900 operating experience working with GEORGE 2 on a large site, and will have developed a high degree of responsibility.

Benefits include subsidised canteen facilities, company contributory pension scheme. Applications should be made to:

MR D. HILL  
PERSONNEL MANAGER  
F. W. WOOLWORTH & CO. LTD.  
ROYAL BARN ROAD  
CASTLETON, LANCASHIRE  
TELEPHONE: ROCHDALE 47301

## University of Kent at Canterbury Computing Laboratory

### Shift Leader

An experienced Computer Operator is required in the Computing Laboratory to lead a three person alternating shift (00.00-18.00/18.00-24.00).

Salary scale £3,110-£3,522 (main) (main) + £2.00 for each evening shift worked.

Application forms and further particulars may be obtained from M. R. Cleyton, Assistant Registrar, The Registrar, The University, Canterbury, Kent CT2 7NZ (Tel. Canterbury 88822, Ext. 283), quoting ref. M77/7, to whom completed applications should be returned not later than 22nd August, 1977.

## AMBER VALLEY DISTRICT COUNCIL

### TRAINEE COMPUTER PROGRAMMER/OPERATOR

(Male or Female)

Salary within range £2,983-£3,323 approximately. Applications are invited for the above post from candidates with ICL 1900 operating experience, preferably with knowledge of the George operating system. The installation in the Finance Department at Hensall comprises an ICL 1901S with DOS 8 and paper tape. The major programming language is COBOL.

This is the second advertisement and previous applicants will be considered. Applications are available from the Personnel Department, Amber Valley District Council, Field House, Chesterfield Road, Sedon, Derbyshire, S43 8BP. 2341, and should be returned by Monday 22nd August 1977.

# No One in DP

United Kingdom's largest DP firm with over 3,000 vacancies

Over 3,000 vacancies in the U.K. and overseas

When you are looking for a new challenge, you will find it here

### Programmers —

U.K., Europe, Australia,  
Canada £3,000-£20,000

EMS are presently in desperate need of thousands of junior to senior programmers worldwide experienced in Cobol, Assembler, PL/1, Plan, Corel and Basic. Clients throughout every town, city and county of the U.K. have requested EMS to urgently recruit thousands of additional programming staff. Equally, we have an ever increasing quantity of enquiries developing worldwide for Programmers with IBM, Honeywell and ICL experience. Recent extensive campaigns have indicated the enormous range of choice available to all Programmers. Whatever type of position you are interested in, either we will find numerous suitable choices available, or we will find them for you. So many interesting opportunities exist only with EMS. All leading employers gain the majority of new staff from junior programmers to DPM's from EMS. Do not delay — register with EMS today.

Consultant: Selma Mills, Don Walklate, Anne Lennell.

### Analysts —

U.K., Europe, Australia,  
Canada £4,000-£25,000

Every week, dozens of experienced Analysts and Analyst / Programmers are placed in new positions throughout the U.K. with increasing quantities of candidates finding lucrative vacancies internationally via EMS. We equally need hundreds more Analysts urgently for positions with Banks, Consultancies, Distributors, Engineers, Freight Companies, Insurance Groups, Stores, etc. etc. You choose any location in the U.K., Europe, Middle East, Australia or Canada and let EMS get results for you. Our hundreds of vacancies advertised during the last few weeks indicate the enormous range of opportunities available. Help us resolve the situation, send us your profile and that is one job less. If you have 1.DDD experience, send theirs to do 1.DDD friends a real favour.

Consultants: Don Walklate, Selma Mills, Anne Lennell.

### Project Leaders, Managers —

U.K. & Worldwide  
£5,000-£30,000

EMS are placing large, increasing quantities of Senior Analysts to Managers, salaries £5,000 to £25,000 nowadays. Demand for Project Leaders in the £5,000 to £7,000 category is running on an unparalleled level. With so many new users creating their first installations, or upgrading to a larger capacity installation, experience is perhaps at last starting to command attractive additional premiums. EMS are now starting to develop the most comprehensive data bank of junior and senior managerial DP staff available in the U.K. today. Few of our managerial vacancies are ever advertised with the great majority of vacancies being filled by our data bank candidates. Complete the EMS profile and stay informed of all future suitable career opportunities in the location of your choice. Remember — EMS are in touch with most installations throughout the U.K. each week.

Consultants: John Wood/Niall Bradley.

### Scientific, Technical & Manufacturers

U.K. £3,500 - £15,000

Computer manufacturers ranging from major international groups, to specialised mini/micro turnkey support companies, have large, increasing quantities of vacancies to cope with substantial growth plans during the coming years. Vacancies range from Graduate Trainees to Systems Programmers, Software Development Designers/Programmers, right up to experienced Senior Managers. Locations include London, Home Counties, Midlands, Stills, Manchester and Scotland. For top positions with all the leading manufacturers complete the EMS application form without delay.

Consultants: Niall Bradley/John Wood.

## Senior Consultants

Kuwait's leading consultancy requires Analysts with previous IBM programming experience to take senior project roles supporting a number of major clients. Knowledge of either Inventory Management, Accounting, IMS, CICS would be especially advantageous. Candidates should possess the ability to train and supervise junior staff. Any knowledge of banking procedures will be welcome but not essential. Applicants for Senior consulting vacancies should have recent IBM / DOS experience, comprehensive knowledge of third generation hardware with a knowledge of I/O operations and hardwired I/O DA equipment, able to consider blocking factors, capacities, transfer of access approaches to data storage, and retrieval in file design. Successful candidates will have co-ordinated or determined the design of at least two complex systems. Equally, an advanced knowledge of DTF structures and understanding of relationships and their use is desirable. At least three years' previous ANS COBOL with some Assembly will be sought in order to review coding samples, teach coding techniques and dump reading.

Consultant: John Wood.

## Programmers—Cobol & Assembler

Candidates are required for a leading commercial organisation. We are seeking a good knowledge of COBOL or Assembler using linking, the sort verb and a familiarity with modular programming techniques. Additionally, we seek broad knowledge of file organisations, programming spec., Writing, Documentation development, Direct Transfer Environments, IBM System utilities and DSS Data Reading. Equally, a basic knowledge of on-line programming would be helpful. Candidates should be single, or married with not more than 1 child and aged 23 to 30. Attractive working conditions in an air conditioned premises exist for successful candidates.

Consultant: John Wood.

## IBM Candidates — D.P.M.'s, Analysts/Programmers, Programmers

EMS currently have a large quantity of new vacancies available in Kuwait. These range from Senior Management roles, down to experienced COBOL or Assembler Programmers. Clients include Consultancies, Banks, Oil Distribution Groups, Finance Companies, Oil Production and State Departments. All experienced IBM staff, of any level interested in attractive financial rewards and the opportunity of working in one of the Gulf's most advanced and interesting regions, should contact EMS without delay. Please note, however, that a maximum of 2 children will apply to all future candidates. For top employment opportunities in the Gulf, complete our applications form and leave the rest to EMS.

Consultant: John Wood.

## Urgent 60 Vacancies E&S Honeywell Group £4,000-£7,000 PLUS O/T PAY & EXPENSES

### Analysts & Programmers to £7,000 + +

EMS currently have the largest Honeywell U.K. Consulting Support Division with large scale investment plans in progress to develop a sophisticated and diversified subsidiary support company. At present, we have a substantial range of support contracts throughout the entire U.K., with further European involvement during 1978. All experienced Analysts and Programmers seeking the opportunity of gaining first hand career experience in a wide variety of commercial and industrial installations should consider our Consulting Support Division. Our confidence is so positive as to invest £300,000 on the new release of micro and mini computers. For job challenge, futuristic Honeywell Support Projects, think EMS: one of the U.K.'s largest systems and programming employers. We urgently require at least 50 more support staff. Contact us for immediate interviews throughout the U.K. to complete the form and we will contact you the day we receive your application.

Consultant: Denise Filly.

### IDS & TDS Programmers To £7,000 p.a.

Our large Consulting Support Division has urgent needs for experienced IDS or TDS Programmers to work on a wide variety of development projects throughout the U.K. and Scandinavia. Clients include Distributors, Engineers, Chain Stores and Distribution Groups and Manufacturers. Equally, interesting TDS vacancies are available with major clients for development of distributive network processing. Career development prospects are unlikely to be rivalled elsewhere in the U.K. Join EMS and obtain the most advanced Honeywell training support in the U.K. with regular Level 6 package training seminars. Expenses will be paid where appropriate for staff joining our Southern or Midlands regional teams. Attractive salaries and expense allowances provide an excellent financial package. For multiple client involvement, think EMS. Think success and apply urgently for early meetings.

Consultants: Denise Filly/John Wood.

### Sales Consultants— Turnkey Systems & Consulting up to £12,000

The enormous success of our Honeywell Support Group has now necessitated a further strengthening of our marketing base to cope with the ever increasing product range of services. We currently have a large quantity of outstanding leads with substantial market development for experienced Sales Consultants. We envisage career progression capable of handling a dual project range of Consulting Support Systems and Turnkey Systems. EMS will be developing a large quantity of application support packages in order to provide Sales staff with a very competitively priced product and full, private supporting facilities. Equally, the Honeywell Consulting Support Division is currently being substantially expanded to ensure effective follow up on our early new marketing successes. All candidates must be capable of presenting a professional proposal at DPM and Board level in a professional manner and be able to justify the level of salary plus commission commensurate with a top consultancy.

Consultants: John Wood.



27 NOEL STREET, EDINBURGH



**oyez****PROGRAMMER/ANALYSTS**

Oyez is a group of companies employing 1,700 people and operating in eight countries. In the U.K. it consists of two specialist printing companies, a publishing company, a conference company and other companies supplying stationery, business equipment and commercial services to a wide market. Oyez Services Limited is the subsidiary of the Group which specialises in providing a range of computer services to commerce and the professions.

Considerable expansion of both Oyez Services' on-line computer packages and the internal computerisation of other companies in the Group is taking place. In both cases systems are being developed to run on POP 11/35 minicomputers under RSTS/E. The programming language used will be Basic Plus and extensive use will be made of telecommunications and on-line techniques.

Vacancies  
Exist for

**FOUR PROGRAMMER/ANALYSTS AND ONE O & M ANALYST**

Most of these positions are within the Group Management Services Department, the others within Oyez Services Limited.

Programmer/  
Analysts

should ideally be familiar with POP 11/35s, RSTS/E and Basic Plus, but experience of other minicomputers and similar operating systems and languages will be considered. Experience of commercial applications is desirable.

The salary offered will depend upon relevant experience and skills but will be in the range of £4,000 - £5,500 per annum. The range of other benefits offered by the Group include a profit-sharing scheme, free life insurance, contributory pension scheme and use of Group sports facilities.

The O & M Analyst will be involved primarily in the early phases of system investigations. Some relevant business experience is required but additional training will be given. The starting salary will be around £3,500.

Applications please in writing to Mr. M. C. P. Feboch, or telephone 407 8055, extn. 216.

**oyez**

Oyez House, P.O. Box 55  
237 Long Lane  
London SE1 4PU

A subsidiary of The Solicitors  
Law Stationery Society Limited

**COMPUTER  
DATA CONTROL**

Up to £3,400 p.a.

If you are good at assembling jobs and data for submission to the computer, and checking quality and controls of completed work, we would like to hear from you now.

Any computer background will be acceptable. Shift working is not required.

Please apply to:

**Argos**

Operations Manager  
Green Shield Trading Stamp Co. Ltd.  
Merit House, Edgware Road  
Colindale, NW9

**GREEN  
SHIELD  
stamps**

**Systems Specialist**

Up to £7,500

Price Waterhouse & Co are seeking a systems support specialist to join a technical support group which they are about to establish. The specialist will be responsible for:

- Developing, maintaining and supporting computer packages for use by a wide range of clients both in the UK and overseas
- Maintaining and supporting a number of computer file interrogation packages used to assist in the audit of the firm's clients
- Developing other computer assisted audit techniques and advising on the technical aspects of auditing advanced computer systems such as database and on-line systems

Applicants should be able to demonstrate a high degree of technical competence, should have at least 3 years' experience and should have proven experience in:

- Developing and maintaining commercial applications systems and software
- Programming in FORTRAN
- IBM operating systems and IPL

The technical support group will be based in modern offices in London Bridge. The successful candidate will work closely with other specialists in the technical support group, with computer officers and with data processing consultants from the firm's management consultancy.

The commencing salary will be up to £7,500 per annum.

Please write in confidence for a job description and an application form to: Price Waterhouse Associates, 32 London Bridge Street, London SE1 8BY quoting M28/811.

**CONTRACT  
ANALYSTS AND  
PROGRAMMERS****U.K.**

Analysts for min. 6 mth. contracts in London, Essex, Bucks and Herts.  
Analyst/Progs with 2 yrs. systems exp. plus good OS COBOL - Hants.

OS COBOL — London, South Coast  
PL1 — London, Home Counties  
H/8000 COBOL — London, Home Counties  
BAL/CICS — London  
NEAT/3 — Midlands  
OS JCL Writer — London  
Burroughs COBOL — London, Home Counties

**OVERSEAS**

Analyst/Progs. with good IBM programming exp. + 2 years system - IMS and/or CICS experience extremely useful.  
Programmers - IBM COBOL, PL1, ASSEMBLER, CICS, IMS DB.

We require the above for 1 year plus contracts in the U.S.A. Locations: N. York, Miami, Atlanta, Texas and California.

OS COBOL — Dublin  
H/66 COBOL — Holland

Top rates of pay — up to £250 per week in the U.K. and up to U.S. \$30,000 p.a. abroad  
For further information ring Christina Carr or Ann Collins on 01-437 2062/3/4

**D.P. SUPPORT SERVICES LIMITED**

Kent House, 87 Regent Street, London W.1

**dp****Customer Service  
Engineer for  
Iran and Saudi Arabia**

Raytheon Data Systems is a manufacturer of mini-computers and terminal oriented data communication systems. Raytheon International Data Systems is responsible for the marketing, sales and service of all its products in Europe, the Middle East, Far East and Africa.

For Iran and Saudi Arabia we are seeking additional men as Customer Service Engineer. The person we require should have a good command of the English language and a thorough knowledge of the servicing of computers and telecommunication equipment.

He will be working in close

collaboration with the Airlines in Iran and Saudi Arabia. This position requires a person who holds a Bachelors Degree in Electronics or IITS Diploma.

We offer an excellent salary and working conditions to the right applicant. Unmarried applicants are preferred.

For any further information, please call or write to: Raytheon International Data Systems, for the attention of Mr. J.O. Verschuur, 53 Spaklerweg, Amsterdam, The Netherlands. Telephone: 020-930787 Ext. 33.

**RAYTHEON**

Raytheon International Data Systems, 53 Spaklerweg, Amsterdam, The Netherlands

**"OUTSTANDING AND STIMULATING OPPORTUNITIES"  
(EAST MIDLANDS/CAMBRIDGESHIRE)****SENIOR ANALYST PROGRAMMERS  
ANALYST PROGRAMMERS  
SYSTEMS LECTURERS**

Our client, a privately owned company that supports and sells an integrated series of products being amongst the most successful software products available within the United Kingdom. These products enjoy acceptance in many major mainframe installations, and are generally regarded as being the most complete and best supported in their particular application area. Development of a further product to be supplied by the company, has led to the necessity of recruiting further KEY PERSONNEL to join the company September/October, 1977.

**Salaries circa £5,000 p.a.  
plus above average fringe benefits**

**SENIOR ANALYST PROGRAMMERS/ ANALYST PROGRAMMERS**

Candidates for the above positions must possess:

- \* a knowledge of PLAN and familiarity with 1900 series hardware or a knowledge of ASSEMBLER and familiarity with IBM 370 series hardware.
- \* preparedness to travel
- \* the necessary personal qualities and attitudes needed to work in close contact with clients.

**SYSTEMS LECTURERS**

Candidates for these positions should possess:

- \* a formal computing background, combining an understanding of systems user implications
- \* the ability and confidence to be able to project themselves, frame and devise education material for seminars with clients.

THE COMPANY OFFERS EXCELLENT (ABOVE AVERAGE) FRINGE BENEFITS INCLUDING: Interest free car loans/substantial travelling allowance/four weeks' holiday/11% non-contributory pension scheme/free BUPA/interest free personal loans/substantial relocation assistance, etc.

These vacancies are of an urgent nature and interested candidates should contact, without delay:  
REG HEATH, 021-236 3781

REF. NO. 77/08/1

**SPECIALIST COMPUTER RECRUITMENT LTD.**

**BIRMINGHAM 021-236 3781 FREEPOST**  
Freeport, Equity and Law House, 35-37 Great Charles Street, Birmingham B3 2BR

**MANCHESTER 061-833 0676 FREEPOST**  
Freeport, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD

**LONDON 01-935 0671 FREEPOST 6**  
Freeport 6, 102, Blandford Street, London W1E 1JZ

**SCA** Computing  
Services  
Association

**MYRIAD  
APPOINTMENTS  
LIMITED**

Computer Personnel Consultants

**ANALYSTS and PROGRAMMERS  
New Projects****C. LONDON**

The continuing demand being placed upon our client's development resources has created the need for additional Analysts and Programmers to develop a range of interesting systems from feasibility to implementation.

Analysts will be given total responsibility for systems which will entail leading small teams of Analyst/Programmers and Programmers, and involve considerable user contact. Programmers will join small project teams within which they will be required to undertake design and specification duties.

Candidates should have been involved with the development of major commercial systems. Analysts should have led, or have the potential to lead, small project teams. Programmers should have sound COBOL experience. Conditions of employment are excellent and the successful candidates can look forward to a progressive career within an expanding environment.

£4,000-£8,500

**LEAD PROGRAMMER****C. LONDON**

A senior programming position exists for a person with both programming expertise and the potential to lead a small team of Programmers. You are probably functioning as a Programmer or Senior Programmer currently and are now seeking the opportunity to use your technical knowledge in a role where you can combine it with your ability to guide others. The team will be involved in the design and programming of sophisticated on-line and batch systems covering a variety of commercial and financial applications. Other responsibilities include: advising on training and standards. It is essential that you have ASSEMBLER and/or COBOL experience. Knowledge of IBM 360/370, DOS, CICS or Quesada techniques would be an advantage. The company offers a first-rate career path, initially in a more specialised technical capacity or via systems analysis.

c. £4,500

**SYSTEMS PROGRAMMER**

KENT (Excellent Relocation)

£5,000-£6,000

Our client's data centre is based on an IBM 370/158 running under OS with communication links to various sites in the UK and Europe.

Candidates for the position of Systems Programmer will be competent in IBM Assembler with a minimum of two years' systems programming on IBM hardware including one year with OS/VS.

Any OS/VS experience including RES and general OS telecommunications would be an advantage, as would the ability to program in FORTRAN and/or COBOL.

The successful applicant will function as part of a small team in a relaxed and friendly highly professional environment.

Conditions of employment are excellent and include pension and sickness schemes, free life insurance, subsidised restaurant and sports and social facilities. There are four weeks' holiday, flexible working and a generous package is offered to those wishing to relocate.

**SYSTEMS ANALYST**

UP TO £6,000

**C. LONDON**

Our client is developing a new system later this year using on-line data collection terminals and VDU's via a front end mini to an ICL machine. They are seeking an analyst with at least 18 months' analysis experience, preferably having been responsible for at least one system from design to successful live running.

The position is based in the West End, very conveniently situated for commuters to both Waterloo or Euston stations. You will be working full-time and will be paid an excellent salary with generous fringe benefits as would be expected from a major international company.

Please telephone for a confidential  
discussion or write to:  
30 Fleet Street London EC4Y 1AA  
01-353 5868



## A Prominent Group Systems Engineers

### MINI AND MICRO REAL TIME SYSTEMS

Hertfordshire

Salaries negotiable ££6,000

A well renowned international group is expanding fast in the field of banking terminals and financial security systems and need a number of experienced Engineers to join their Hertfordshire location.

Systems Engineers are required to establish and document systems requirements and specifications, to undertake feasibility studies and co-ordinate projects including commissioning of systems and final acceptance of prototype systems.

The applicant must possess HNC with endorsements in Electronics and ideally be an associate member of I.E.E. or equivalent body.

A minimum of 3 years' background in mini computer systems, programmed in ASSEMBLY language is necessary and hardware and software design experience preferred. Micro processor knowledge and project control experience would be ideal.

Please reply to our CROYDON office quoting ref: CW52-75.

01-686 9693 (24 HOUR ANSWERPHONE) 061 236 2419 FAULKNER HOUSE,  
19, PARK STREET, CROYDON, CR9 1TN 1 FAULKNER STREET, MANCHESTER, M1 4TD

COMPUTER AND  
PERSONNEL  
CONSULTANTS

**CAPP ASSOCIATES**  
LONDON AND MANCHESTER

Computing  
Services  
Association

## CREDIT LYONNAIS

a leading French Bank, long established in London, has recently installed a 256K IBM 370/125/2 which is currently being used on batch systems and to which the bank's 16 existing terminals will shortly be connected for on-line applications.

Two additional staff are required to work on a 2-shift, 5-day week system. Salaries are inclusive of shift allowance and there are attractive fringe benefits, including L.V.'s and an annual bonus.

### SHIFT LEADER

with at least 2 years' experience, including 370 operation under DOS/VS. A starting salary of around £3,750 is envisaged.

### COMPUTER OPERATOR

with at least 1 year's experience, including 370 operation under DOS and, preferably, VS. A starting salary of around £3,250 is envisaged.

Applicants for both posts should have a mature and responsible attitude to their jobs and be able to work well in a small team.

Please apply in writing to:

Mr. H. Young  
Personnel Manager  
Credit Lyonnais  
P.O. Box 81  
89-94 Queen Victoria Street  
LONDON EC4P 4LX

### RESEARCH POST IN THE SOCIAL RESEARCH UNIT

Supported by the Medical Research Council, for a person with computing experience to deal with programming and data handling work on projects concerned with social factors in the onset and course of psychiatric disorder in women. Initial salary for a full-time appointment would be within the gross range of £3377-£4446 p.a. according to experience. Applications with C.V. details to Senior Assistant Secretary (Personnel), Bedford College, Regent's Park, London NW1 4NS.

### BRUNEL UNIVERSITY LECTURER IN COMPUTER SCIENCE

Applications are invited for the above post from candidates with a good honours degree and research or industrial experience in computing. Preference will be given to those with experience in one of the following areas: data processing, systems analysis, databases. Salary within the first seven annual increments of the Lecturer scale £1356-£4807 plus £450 London Allowance. The post is to be filled as soon as possible. Application forms and further particulars from Assistant Secretary (Establishments), Brunel University, Uxbridge, Middlesex, UB8 3PH, or telephone Uxbridge 37158 extension 49.

**FREELANCERS**  
WHATEVER YOUR RATE  
WE WILL TOP IT  
RING 01-656 4581

### COMPUTER OPERATING TUTOR

Over £3,000 per annum + +  
We are the largest commercial training organisation in the United Kingdom and we train students for the major computer companies including the Ministry of Defence. Previous teaching experience an advantage. Salary over £3,000 p.a. 9.00 a.m. to 5.30 p.m. Monday-Friday. If you have the desire to teach please phone me now. John Cooke, 01-482 1841.

## SYSTEMS CONSULTANCY U.K. AND OVERSEAS

The Company is a world leader in the development and application of a specialist range of systems for client companies and governments. Currently projects are being pursued in South America, the Middle East, the Far East and the U.K. They wish to strengthen their small systems team by the appointment of a young professional who will be required to act as the D.P. Specialist within a project group responsible for the design and implementation of systems in U.K. and Overseas.

This is an opportunity for a true professional to extend his/her experience working independently on the design of commercially orientated computer systems within a highly successful company. Proven computer systems design is required preferably with a financial bias and experience of I.B.M. equipment. It is envisaged that the successful candidate will command a salary in the range of £5,500 to £6,500 together with an attractive range of major company benefits.

An applicant's name will not go forward to our client until he or she has had a full briefing on the job position and the company environment and until the applicant has given consent. Please send a summary covering employment history, achievements, current remuneration and age to:

Mr. L. R. Hetherington  
BDC International,  
28 Dorset Street,  
London W1M 3FU

Recruitment consultants  
licensed in the U.K.

**BDC**

**SEGAS  
CROYDON**

## PROGRAMMERS

Join one of our project teams expanding existing systems and paving the way for enhancements to our current hardware. Segas with 1.4 million customers and 10,500 employees is building one of the most progressive computer set-ups in the country. It has been designed to meet the needs of Britain's Gas industry — one of our richest natural resources.

A 1M-byte 370 145 is currently installed running a wide range of batch and teleprocessing applications under OS VS1, CICS and VTAM. An additional 2M byte 370 148 is on order for delivery later this year to cater for the first phase of a major expansion. This will involve the implementation of a large terminal network serving the Customer Accounts and Engineering functions, and the development of conversational facilities.

We need:—

## SENIOR PROGRAMMERS

Up to £5787 per annum. A senior position requiring a minimum of 3 years Cobol experience. In addition a knowledge of CP VS.1 and/or Assembler would be an advantage.

## PROGRAMMERS

Up to £4431 per annum. For these posts we are prepared to consider professionals with a minimum of 18 months post-training programming experience.

★ Salaries include Metropolitan Weighting and 1976 Salaries Supplement etc.  
★ Good working conditions  
★ Generous holidays  
★ Sick pay, pension and insurance schemes  
★ Sports and social facilities.  
Write giving full details, within 7 days, and quoting ref. F.2961 to:—  
Personnel Manager, Segas, Segas House, Katharine Street, Croydon CR9 1JU.

**SEGAS**  
A part of British Gas

## COMPUTER OPERATIONS CONTROLLER

Up to £5,000 p.a.

To take charge of an expanding computer facility and maintain the efficient operation of our N.C.R. Century 261 with 385K memory, high speed tape decks, 655 disc and on-line V.D.U.'s, N.O.F. and cassette input.

Experience with N.C.R. Century series equipment is essential, preferably using 83. A Shift Leader with more than 3 years' experience will be considered. Shift working is not required, although the person appointed will be responsible for three teams working shifts during 5 days a week.

**Argos**

Please apply to:—

Operations Manager  
Green Shield Trading Stamp Co. Ltd.  
Merit House, Edgware Road  
Colindale, NW9

**GREEN  
SHIELD  
STAMP**

# SOFTWARE DEVELOPMENT

Conveniently located just outside London, the software development group of a leading mini-computer manufacturer is being expanded.

Environment and facilities are first-class; all development work is done on-line using dedicated in-house systems.

The existing project teams are youngish (25-35), mostly graduates, and contribute to a lively and stimulating atmosphere.

Typical large-company benefits are available and assistance with relocation expenses may be granted. A range of different projects are either established or due; hence the following opportunities:

### DBMS DESIGNER £ NEG

In this post you will make a positive contribution to the design of a database system. Your experience will include implementation of a DBMS package or a database system. A knowledge of access methods is especially important, along with very good Assembler experience. RW 31/1

### COMPILER DESIGNER £ NEG

This is a key position to lead the development of a COBOL compiler. You must have been responsible for the successful implementation of a commercial compiler from scratch. You must also be able to lead, advise, and guide a team of seven or more. RW 31/2

For these two key positions salary and terms will not present a problem for the right people.

### TP SYSTEMS SPECIALISTS to £7500

Two key posts are to be filled on this project. You should have a first-class in-depth involvement in either transaction processing, telecommunications, or operating systems software. In addition, experience on the design of operator interfaces and pre-processing systems would be an advantage. RW 31/3

### COMPILER SPECIALISTS to £7500

Involvement in compiler design and development preferably for COBOL or RPG II is a must for these positions. You must also have significant team leadership experience in a product development role and appreciate the importance of systems testing and quality assurance. RW 31/4

### DBMS DEVELOPMENT SPECIALIST c £6000

Extensive Assembler experience, especially in the DB/access methods area, is the basis for this position. You will work on a new DBMS development. Any additional expertise in T/P or programming languages would be a plus.

### PROGRAMMERS to £6000

Programmers are required on all the projects referred to here; the basic requirement is good Assembler experience on any computer. If in addition you have some knowledge of, and empathy with, software constraints and requirements, you will be highly successful in this software development group. This is a first-class opportunity to develop your skills and embark upon a rapid career development path. RW 31/6

**hutchinson-scoggins recruitment**

10 Dover Street London W1X 3PH

Telephone 01-499 4501



# DISTRIBUTED PROCESSING LIVERPOOL

Our Clients, a major force in the food industry, are shortly to install new Honeywell hardware worth in excess of 2 million pounds. Their equipment consists of a dual Honeywell 6805 system, based in North Liverpool, supporting 44 level 8 machines in locations throughout Great Britain. They are currently involved in development of sophisticated integrated systems utilising the latest Honeywell hardware and software, including T.D.S. and I.D.S.

## Business Analysts

He/she will be involved in individual applications. They will be responsible for producing systems specifications which fit into the overall integrated system. Travel to user sites throughout Great Britain is envisaged, combined with overall responsibility for the successful implementation of the project. Previous Honeywell experience is not necessary, but an understanding of the Food / Bakery industry is advantageous.

## Systems Software Designers

Involvement in overall design as well as liaison with applications teams to integrate projects. Applicants must have GCDS experience and a knowledge of one or more of the following would be advantageous:

TDS/IDS  
NPS  
Level 8 DST

## APPLICATIONS PROJECTS TEAMS Designers/ Programmers

A wide range of programming skills are required for this exciting project, including Programmers, Senior Programmers, and Design / Programmers. Applicants should have experience of one or more of the following:

COBOL (Honeywell preferred)  
ASSEMBLER (Level 6)  
G.MAP

## Project Leaders

He or she will take control of individual projects ensuring they are correctly designed and interfaced with an overall system. They will be responsible for ensuring that the systems are produced on time, and in liaison with Systems Software Designers fully utilise hardware facilities.

## Systems Designers

Responsibility for interpreting business analysts specifications into working integrated systems. Ideally, candidates should have a good understanding of Honeywell 6, 88 software and/or hardware.

The positions are based on the outskirts of Liverpool, within easy access of coastal areas and the Lake District. Initial interviews will be held in Manchester, Birmingham and London.  
CONTACT: DAVID WADE 061-833 0676 REF: 77/09/5

### SPECIALIST COMPUTER RECRUITMENT LTD.

**BIRMINGHAM 021-236 3781 FREEPOST**  
Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR

**MANCHESTER 061-833 0676 FREEPOST**  
Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 6BD

**LONDON 01-935 0671 FREEPOST 6**  
Freepost 6, 102, Blandford Street, London W1E 1JZ



# SCR

## Data Controller Flight Catering Management System Heathrow Airport

Trust Houses Forte Airport Services are a leading company providing comprehensive catering and retail services at airports and for airlines both in the U.K. and Europe.

We are now implementing a stock accounting, invoicing and management information system for our Flight Catering Unit at Heathrow using an I.B.M. computer system.

A competent person is required to control the system. Responsibilities include liaison with company management and computer bureau, maintenance of computer files, preparation of input data (currently paper-tape) and checking/distribution of computer reports.

Applicants must be experienced in computer documentation control and relevant operational problems connected with fixed time-scales. Knowledge of Catering industry would be useful though not essential.

The successful candidate must have 'A' level or equivalent educational standards, together with sufficient maturity and communication skills to work in conjunction with all levels of catering staff. The accuracy of the results produced by the system will be very dependent upon the motivation provided by the 'computer person'.

The position will have Management status and normally operate on a 5 day week basis. Salary will be negotiable according to ability. Persons already earning £3,500 p.a. are not likely to be considered. The company provides free food on duty and other contributory pension scheme and other benefits expected of an international organisation.

Please write for an application form or telephone: Mr. E. G. Anderson, Data Processing Manager, Trust Houses Forte Airport Services Limited, Building 472, Heathrow Airport, Uxbridge, Middlesex. Telephone 01-755 7246.



## Major Opportunities in DP for Analysts and Programmers

The Company  
We are the largest British manufacturers of commercial vehicles and are committed to a major planned systems development programme at our Heavy Vehicle Divisional Headquarters in the North West of England.

The installation  
We currently have a 1Mb IBM 370/145 operating under OS/VS1 and are actively making use of the latest distributed processing concepts using microcomputers, data base and data communications techniques.

We are looking for  
Analysts and programmers who have a minimum of 2 years DP experience preferably in a manufacturing environment. Knowledge of data base and on line systems would be an advantage. Programmers should have a sound knowledge of PL/I, Assembler or Cobol.

We are offering  
• A challenging and exciting environment with good career potential  
• Attractive Salaries  
• Employee car purchase plan  
• Over 4 weeks annual holiday  
• Assistance with Relocation where appropriate  
• Other benefits which are to be expected from a large company.

Initial interviews will be held locally.  
Applications should be forwarded to:  
J.T. Swindhurst Recruitment Co-ordinator  
Heavy Vehicle Division

## Leyland Truck & Bus

King Street, Leyland, Preston,  
Lancs PR8 1SN.  
Telephone: Leyland 21400 Ext. 73



### University of Bradford COMPUTER OFFICER

Applications are invited for the above appointment in the School of Studies in Computing and Environmental Science. The duties will consist of providing programming and technical advice in connection with teaching and research programmes. Applicants should have a degree or equivalent qualifications and previous programming experience is essential. Salary on a 9 month contract is £3,004.45 p.a. (under review). Application forms and further particulars are available from the Personnel Office, University of Bradford, Richmond Road, Bradford BD7 1DP, by writing or telephoning Bradford 33458 ext. 252.

## contract

IBM Assembler programmers required for 3-month contracts in NORWICH starting during August.

EXCELLENT RATES (extra for CICS experience).

+ Hotel expenses + Flexi-time + Free Lunches

dean associates Tel: 09237 79617

## CHIEF SYSTEMS ANALYST

c. £5,000

Commercial organisation with ICL 1901T, EDS 60s and VDUs is shortly embarking on an exciting development phase and seeks applicants for the above post.

Ideally you will have several years' total commercial systems experience together with a CDBDL programming background. The position also entails deputising for the D.P.M. in his absence.

Application forms will not be used so please send concise relevant details to:

C. C. Lester, Finlay and Co. Ltd.  
Collingwood House  
Mercara Road  
London N19 4PL

### WEST HERTFORDSHIRE COMPUTER JOINT COMMITTEE

## Data Processing Manager/ess

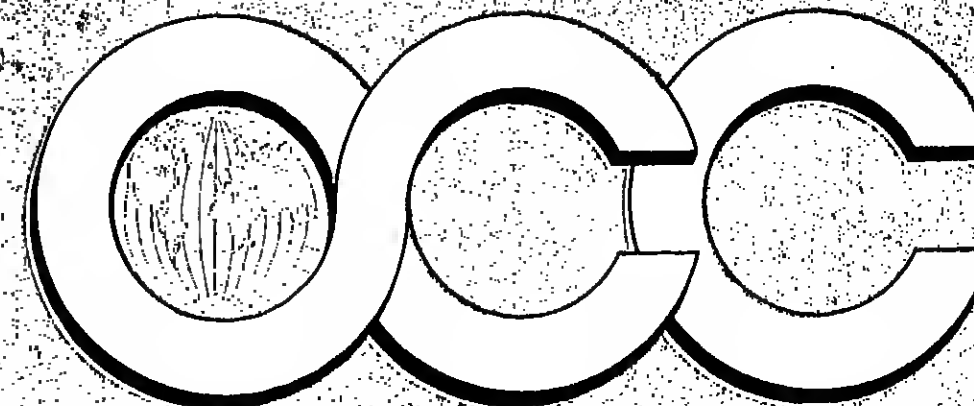
Grade: Principal Officer 2 (6-10)  
£6729-£7407, plus £502 supplement and  
£180 inner fringe allowance, per annum.

Applications are invited for the above post from persons with wide experience of Local Government computer applications. The IBM 370/126 computer installation is located at the Town Hall, Welton and provides data processing services for three local authorities in Hertfordshire. RJE terminals are to be installed and the successful candidate will be expected to develop both new and existing systems. A thorough working knowledge of RPG 2, Assembler and DOS/VS is necessary.

Commencing salary dependant upon qualifications and experience. Temporary assistance with housing accommodation available in appropriate cases.

Application forms and full details of appointment obtainable from Mr. Jeffery, LL.B., Clerk of the Computer Joint Committee, 18 St. Peter's Street, St. Albans, AL1 3LU - St. Albans 66100. Extension 253, to whom completed applications should be sent. Closing Date - 30 August 1977.

16 Bedford Row  
London WC1R 4EB  
01-242 9356  
Telex 21120



Specialists since 1971  
in UK and international  
computer appointments.

## computer personnel limited



WESTINGHOUSE

## WEST COUNTRY & BERKSHIRE

### The Company

Westinghouse Brake & Signal Company Limited manufactures a wide range of electrical, electronic and mechanical products and systems, using modern techniques.

The company is structured into autonomous manufacturing Divisions. Two divisions, each one with an independent software group, are currently recruiting.

## Signal & Mining Division

is one of the largest Divisions within the group, responsible for the complete design, manufacture, installation and commissioning of Railway Signalling and Mining Control Schemes in the U.K. and overseas. In view of the increasing proportion of Computer based equipment contracts, vacancies are available in the following areas:

Real Time dedicated rail system monitoring  
Real Time Software Development  
Engineering support Software

The main computer configuration is based on Hewlett Packard 21M series Mini computers used singly or as a network of mini computers.

## Real Time Programmers & Analyst Programmers

To £4,200

We are looking for a minimum of 1 to 2 years' ASSEMBLER experience on mini computers. Applicants should have the ability to design programs and must be efficient coders. They will work on implementation and systems.

We would also like to hear from Real Time Assembler Programmers with systems experience. Ref. 562/CW.

## Systems Analysts & Project Leaders

To £6,000

The Division has requirements for experienced System Designers with supervisory experience to take full responsibility for Systems Design and Project Leader duties, such as staffing. Ref. 563/CW.

## Automation & Controls Division

specialises in electronic computer based systems for the control and distribution of gas, oil, water, electricity and also deals with numerous computer control systems for industry and engineering purposes. The Software Group is supported in all its development activities by inhouse DEC computer configurations. The complete software systems operate under the control of a special purpose Westinghouse executives for systems using PDP 11/04 and DEC executives RSX 11 M for PDP 11/34.

## Analyst Programmers & Systems Analysts

To £4,800

A number of vacancies exist in this division for Programmers or Analyst/Programmers or Systems Analysts with a minimum of 1 to 2 years' experience in High level languages (FORTRAN, CORAL, RTL). A knowledge of RSX 11 operating systems would be advantageous.

Real Time Systems design experience in Industrial Process Control, Telecommunications, Message Switching and industrial tele-control fields would be relevant. Ref. 564/CW.

There may also be opportunities at a later date for PROGRAMMERS with MICROPROCESSORS experience. Ref. 567/CW.

### The location:

Applicants to all the above vacancies will be given a choice of base at Chippenham (Wiltshire) or Wokingham (Berkshire).

Chippenham is the company's main site. Only 1 hour 10 minutes from London by fast train and 12 hours by car, with the M4 motorway (exit 17) nearby. It is also within easy reach from the South Coast and the Midlands and only half an hour from Bristol. It is a very pleasant part of the West Country and offers reasonably priced housing (three bedroom house from £10,000).

Wokingham is a newly acquired smaller site offering an alternative work base near Reading and London.

Opportunities also exist for overseas contracts and overseas travel. Salaries are negotiable according to qualifications and experience and location. A very attractive relocation package is available where appropriate, as well as the usual large company benefits.

To apply for any of the above positions or for further information, please telephone or write to: **Recruitment Unit** on 01-242 9356. If it would be more convenient to telephone in the evening or at weekends, please telephone 01-274 6372.





## Consultants up to £16000

## Analyst Programmers

up to £110000

### Holland

The Market Leader in the design and implementation of software systems in Data Communications wish to expand their Project Teams in Holland. There are a number of positions available from junior programmer/analysts to senior Project Managers. Special attention is paid to providing opportunities to advance your career both technically and managerially within a highly professional environment at the forefront of Software innovation.

It is important to have had experience of Data Communication software some of which should have been using Mini Computers. Major projects actively engaged upon includes Real-time (process oriented) systems, on-line applications, message switching and computer networking.

Every effort will be made to ensure that relocation to Holland is as smooth as possible. All necessary expenses are paid and Hotel accommodation is provided on arrival. Career prospects and personal security are very good indeed and a high salary will be negotiated with you in the above ranges.

Candidates should telephone  
01 499 9214 or 0103120 461854

CW30/1 AMSTERDAM/MAYFAIR

## Systems Support

c.£6500

### Dublin

We have been retained by a leading International Computer Manufacturer with a marketing and production facility in Ireland. Due to the successful sales of the new range of multiwork station computers and terminals, it is necessary to recruit SYSTEMS SUPPORT SPECIALISTS.

As the successful candidates will have total responsibility for the design and the development of business systems at their new user installations, five years experience of designing and programming commercial systems is desirable.

The company offers candidates the opportunity to take on further responsibility, work with interactive hardware and contribute to their successful sales effort. Excellent fringe benefits include, bonus, very high mileage allowance and relocation expenses.

CW30/8 DUBLIN/MAYFAIR

## Rural Kent

Our client company is one of the most respected companies within the area and has achieved a considerable growth record over the past few years.

The premises are modern and NOT based on an industrial estate, but situated in a pleasant rural landscape, and within striking distance of a mainline station. There is also the opportunity to use the company bus if necessary.

In addition to an excellent salary, successful candidates will be given full relocation expenses (where applicable).

See details  
Ann. 10/84

### c.£6000 + relocation expenses

The current team are involved in sophisticated warehouse stock control and financial/accounting projects.

Applicants applying should have three years Systems background which should include strong contributions to at least one major project. A programming background of RPG 11 and ASSEMBLER is essential and experience of motivating and leading a small team of programmers.

See details  
Ann. 10/84

### c.£4500 + relocation expenses

Two years RPG 11 and ASSEMBLER background is required for the above applications area.

Programmers wishing to enter into Systems Analysis at a later date will find this position of particular interest for their career progression.

CW30/8 KINGSTON

## 1900 COBOL Programmers

up to £7500

### Homa Counties

Are you looking for good sound training on and off the job? Our client is looking for ambitious programmers to work as part of a project team with a possibility of leadership; talent is more essential than experience.

So if you have any one or more of the following skills:

- \* On-line application
- \* Structured Programming
- \* DRIVER/TP Monitors
- \* MAXIMOP
- \* FILETAB/FTL 6
- \* Database Techniques

and live or will relocate (with generous relocation expenses) to BEDFORDSHIRE, ring for confidential discussion or write without delay.

CW30/10 KINGSTON

## Contracts

### Holland/Amsterdam/The Hague

CCC BV, based in Amsterdam, have been requested by two of the biggest computer manufacturers and a sophisticated software house, to fulfill a number of opportunities involving the following:

Mini Assembler Programmers with INTEL 8080/PDP 8/PDP 11  
RPG 11 Programmers Systems 3, Systems 32, 2903, 2904  
Programmers experienced in system conversions, COBOL, RPG 11  
ICL new range application programmers, system programmers and systems analysts.  
IBM, OS, PL/1, DL1  
IBM, DOS, CICS, ASSEMBLER and/or COBOL  
IBM System Programmer, OS, VSI, VS2 and MVS

You can expect interesting assignments, and a very high salary and in some cases a permanent position at the end of your initial assignments.

Speed is of the essence, so please telephone our Mayfair office, 01-499 9214 as soon as is convenient, or our office in Amsterdam, 010-3120-461844

CW30/4 AMSTERDAM/MAYFAIR

## Programmer Analysts

£4,500 - £6,000 pa + relocation expenses

One of Ireland's leading companies has recently commenced development on an On-Line interactive computer network.

We wish to recruit on their behalf, top class programmer/analysts to come in at the initial stages of this development. The job involves the design and programming of On-Line Order Entry & Enquiry Systems. We are looking for people with at least 2 years BASIC + under RSTS, backed up by additional systems and programming experience. Most junior posts are available for less experienced people.

The company offers above average salaries and an opportunity to join an expanding operation with a commitment to Real Time interactive processing. A Dublin or Cork location is available for these positions.

CW30/3 DUBLIN/MAYFAIR

## Recruitment Sales

CCC is a highly respected and successful recruitment company with offices in London, Dublin and Amsterdam. We wish to appoint a highly motivated sales consultant with a proven sales record, preferably within the Data Processing industry, with ability to secure and implement recruitment assignments.

This is an opportunity to succeed in a buoyant market where personable and determined men or women can earn a very high standard of living.

Remuneration is based on a negotiable salary, generous commission scheme and profit sharing. For a confidential discussion, please telephone or write to Stella Mitchell, Kingston.

CW30/7 KINGSTON

## Design a New Operating System

### West London

Our client requires a System Software Designer to work in a small experienced team of highly motivated people. They will be designing a new operating system for an existing mini and as yet an unannounced mainframe. Previous experience of low level coding down to the hardware is essential and some knowledge of communications is preferred.

For a confidential discussion contact Stella Mitchell at the Kingston office.

CW30/8 KINGSTON

## Programmers Systems Analysts

There is a time when you can vastly improve the spectrum of your knowledge but use your abilities to take financial control of your earning power. A wholly owned subsidiary, of a large and most respected public company involved in a vast range of commercial software projects, need to recruit a number of talented programmers and analysts.

Business systems based on COBOL and RPG 11 are being developed to a large degree at their London headquarters. In addition however, a definite commitment has been made to the setting up of a branch office in Holland due to their awareness of the necessity to expand into Europe.

Career development is considered a high priority of our client who would be happy to discuss opportunities, structure and philosophy of their highly reputable company with you.

CW30/5 MAYFAIR

## Systems Software Programmer

c.£5700

Here is the opportunity of a lifetime to return back to your native homeland and work in one of the more pleasant areas of Scotland and be within commuting distance of Glasgow. This would also suit any computer professional who is ambitious and would appreciate getting in on the ground floor of a new department and enhance his or her career with a sophisticated computer training with a well established solid organisation who are a well known name.

The candidate we are seeking should be familiar with OS/VS and OS/VSI and have ideally a strong ASSEMBLER and COBOL background. A knowledge of IMS/DLI would be of added interest but not essential as training will be given in this area.

The configuration is a large acela IBM 370 using multiple user files with on-line interactive and batch terminals with both DB/DC and RJE technology.

There are additional benefits including relocation assistance and free life assurance plus four weeks holiday.

CW30/2 KINGSTON

Kingston: 44 Wood Street, Kingston upon Thames, Surrey.  
Telephone 01-549 3212 (24hrs) Telex 27950  
London: 5-6 Yarmouth Place, Brick Street, London W1Y 7DW.  
Telephone 01-499 9214 Telex 27950  
Dublin: Canbarra House, 24 Lower Leeson Street, Dublin 2.  
Telephone 762170 762188-765692 Telex 30742  
Amsterdam: Rijnvlietsteet, Amsterdam 1010.  
Telephone 461844 Telex 11336

Computing  
Services  
Association

App. 11/84







### A Prominent Group Technical Support Engineers

#### MINI AND MICRO REAL TIME SYSTEMS

**Hertfordshire** Salary negotiable £4,500 + Co. Car

A well renowned international group is expanding in the field of banking terminals and financial security systems and need a number of experienced engineers to join their Hertfordshire location.

Technical Support Engineers are required to assist with new installations and with technical trouble shooting. They will also support demonstration equipment both in house and at exhibitions and sales presentations.

The applicants must possess an HNC or C & G in electronics and have spent at least 3 years in a mini/micro environment. Applicants should be able to interpret and write programmes in basic machine language and ASSEMBLER. A knowledge of formatting and directives is also desirable, together with extensive digital hardware experience.

The position supports company technical personnel in the U.K. and abroad.

Please reply to our CROYDON office quoting ref: CW60-75.  
01 686 9693 (24 HOUR ANSWERPHONE) 061 236 2419 FAULKNER HOUSE,  
19, PARK STREET, CROYDON, CR9 1TN FAULKNER STREET, MANCHESTER, M1 4YD

**CAPP ASSOCIATES** Computing Services Association  
LONDON AND MANCHESTER

### MYRIAD OPERATIONS

Computer Personnel Consultants

#### SENIOR OPERATORS SHIFT LEADERS

Large 370 series £4000+

The data processing operations of a major commercial organisation in CENTRAL LONDON, are currently undergoing a review, pending expansion. If you can offer a minimum of two years' DOS/VS or OS experience, you may be invited to participate in this exciting programme.

At present you are probably a senior operator capable of demonstrating a sound appreciation of the principles involved in the organisation of a computer team. You should also be able to display considerable supervisory ability.

You will be encouraged to become involved with all aspects related to both your shift and the operation of the department as a whole.

Prospects for career advancement are excellent, and as you would expect the starting salary is enhanced by a range of first rate fringe benefits.

Please telephone for a confidential discussion or write to:  
101 East Street, London EC4A 3BS  
01-353 5800

# THORBAR

RECRUITMENT AND CONSULTANCY SERVICES

Greenock House 19 Cuckfield Road Hurstpierpoint Sussex  
Telephone 0273 833848

## SPECIALISTS IN DP AND EXECUTIVE RECRUITMENT

### JUNIOR PROGRAMMERS SURREY

**SALARY TO £3,500 PLUS ATTRACTIVE FRINGE BENEFITS. BONUS. SUBSIDISED MORTGAGE. FREE LUNCHEON FACILITIES, ETC.**

Our clients have invested extensively in IBM 370 and are a recognised leader in advanced computer technology. Its aim is to develop the most modern computing and programming technique including structured programming and top down design. As an organisation they are efficient and highly profitable and insist on the highest standards from their employees. They are wishing to expand the department and need young and energetic people to join their existing team and would look for the candidates to have the following experience:

1. From six to 18 months' experience in programming. (Any computer.)
2. An ability to communicate is vital.
3. An acceptable personality that would fit into a team environment.
4. A good academic level of education would be expected.

They offer a first-class career opportunity which could develop into systems or software whichever way you are best suited.

**WE HOPE FROM YOUR TELEPHONE CALL OR LETTER TO HAVE THE OPPORTUNITY TO DISCUSS THE NEXT IMPORTANT STEP IN YOUR CAREER.**

### Distributed Computer Control

BRISTOL: UP TO £5500

Applications are invited for an appointment as a Research Officer in the Control Technology Section of the Scientific Services Department. The Section is actively engaged in the development of distributed computer control systems for modern generating stations.

The successful applicant will have a good honours degree in engineering or applied science, and be in his/her early twenties. At least two years' industrial experience together with experience in assembly level programming is desirable. The successful applicant will also be expected to make a major contribution to the software aspects of a boiler control system currently being installed at Pembroke Power Station, West Wales.

The post will be based at the new laboratories at Bedminster Down, Bristol, but will be located at Portishead until early 1987. Visits to power stations throughout the Region will be an essential part of the work.

Applications on Form AF/1, obtainable by phoning Bristol 32251 Ext. 18, or by writing to the Personnel Manager should be completed and returned to him quoting Vacancy Notice Number 265/77 by not later than 19th August, 1977.

**Central Electricity Generating Board**  
South Western Region  
Oakfield Grove, Clifton,  
Bristol BS8 2AS

### EXPERIENCED COMPUTER OPERATOR

UDT, Britain's leading independent finance company has vacancies for two computer operators in the computer installation at Cockfosters. This installation consists of an IBM 370/145 (to be changed later this year to an IBM 370/148) operating under OS/VS1 and services a network of 50 terminals supported by CICS. A three shift system covering 24 hours per day, five days a week, is operated.

The UDT computer installation is situated in pleasant surroundings on the edge of the green belt.

Candidates should be at least 21 years of age, with eighteen months IBM OS/VS1 or MFT experience and have a good educational background ('O' levels are necessary, 'A' levels will be an advantage).

To the right applicant we offer:

- \* a starting salary of £3,300 per annum inclusive of shift allowance.
- \* opportunities for occasional overtime, at week-ends
- \* seventeen days holiday
- \* subsidised staff restaurant.
- \* comprehensive sickness benefit scheme.
- \* non-contributory pension and life assurance scheme.

After a qualifying period of service, staff leave.

For an application form, please write or telephone The Personnel Manager, United Dominions Trust Ltd., Holbrook House, Cockfosters Road, Cockfosters, Barnet, Herts., EN4 0DY. Telephone Number 01-449 5533, extension 284.

### Programming Opportunities With GOODYEAR

We are the world's largest manufacturer of aircraft and have major plant installations at Wolverhampton, Luton, and Buxton. We have a countrywide network of branch offices and are looking for a number of experienced programmers to join our staff.

An IBM installation in Wolverhampton processes aircraft orders. The system 370/145 is already catering for the needs of a large and growing demand for civilian and commercial aircraft.

We are now looking for programmers with a minimum of 2 years' experience in the development of business systems. The successful candidate will have the ability to contribute to the development of both new and existing systems.

These appointments offer excellent opportunities for career development and a comprehensive range of fringe benefits, including life insurance and contributory pension scheme.

Substantial assistance with relocation expenses will be paid where appropriate.

Applications should be made in writing to the Staff and Factory Recruitment Officer, The Goodyear Tyre & Rubber Co. (GB) Ltd., Buxbury, Wolverhampton.

### Computer Personnel International

110 St. Martin's Lane, London, WC2N 4BH

**SHIFT LEADER to £4,750 Inc.**  
As shift leader you will have had a good knowledge of the IBM 360/370 background. You must be at least S/L or Ssr. Op level at present and be used to running a shift and carrying all the accompanying responsibility.

**SNR. OPERATOR to £3,600 Inc.**  
You must have at least 2 yrs. Univac or IBM experience and be confident enough to train all about our new equipment quickly. You will be expected to maintain the S/L in his/her absence.

We operate a 3 shift system, Monday to Friday and you will receive all the benefits associated with a large group, including discounts and L.V.s.

Contact MARILYN DAVISON on 01-836 6776

<h4>COBOL COMPUTER PROGRAMMING INSTRUCTOR</h4> <p>Over £5,000 p.a. + +</p> <p>We are the largest commercial training organisation in the United Kingdom and are now seeking for the right candidate to join our staff. The successful candidate will be responsible for the instruction of students in the use of COBOL programming language. Salary negotiable. Please send your CV to: Mrs. J. H. Smith, 110 St. Martin's Lane, London, WC2N 4BH.</p>	<h4>ELECTRONICS TECHNICIAN</h4> <p>We are a leading electronics company and are now seeking for a technician to join our staff. The successful candidate will be responsible for the maintenance and repair of electronic equipment. Salary negotiable. Please send your CV to: Mrs. J. H. Smith, 110 St. Martin's Lane, London, WC2N 4BH.</p>	<h4>AMBITIOUS TO SUCCEED</h4> <p>£6,000-£15,000</p> <p>We are a W.I. agency that needs a dynamic individual to run and set up a new computer division handling personnel still. We're young, progressive, with loads of ideas and brains to carry them through. Total independence to do it your way as long as you can really do exceptionally well.</p> <p>Phone 01-437 4060 Shelia Walsh, London Appointments</p>
---	--	--

# SENIOR APPOINTMENTS

## CONSULTANTS—Systems & Programming Analysts

### BANKING SPECIALISTS — CITY

**c £8,000 +, plus Profit Share plus excellent fringe benefits**

Our clients are one of Europe's largest and fastest growing software houses. Their record over the past few years has been exceptional and the respect the Company has built up within the finance world is well known.

Candidates, who could well be currently working within a finance house or the service industry, will need in common with an in-depth knowledge of the following:

- a) The "SWIFT" banking network
- b) Foreign Exchange
- c) In-house Evaluation
- d) Systems Design

A knowledge of SID's as well as POP II's would be an advantage although not essential.

For a confidential discussion please telephone Dean Williams immediately, quoting Ref. No. CW-141.

**Insight Marketing & Personnel Consultants Ltd.**  
72-75 Marylebone High Street  
London W1M 4AJ  
Telephone: 01-488 6844

### ICL 1900/2900 Analysts and Programmers

**£5-£8,000 + Low-cost mortgage**

**London**

Our clients are a major financial organisation with a solid reputation in the professional business world. They are currently installing ICL New Range equipment to augment their existing configurations.

As a result of this expansion and an ever increasing workload, they are now seeking to recruit Analysts and Programmers with a minimum of three years experience in a commercial environment. Ideally, candidates will possess a sound knowledge of ICL 1900/2900 applications; experience of Database or on-line systems would be a considerable advantage.

Successful candidates will be able to display the degree of presentation and professionalism required when liaising with financial user departments at a senior level.

In addition to excellent career prospects and involvement in new areas of applications and equipment, the company offer an impressive range of benefits including mortgage assistance schemes, low cost insurance etc.

Ref: MGH 652

**Lloyd Chapman Associates**  
23-25 Maddox Street London W1R 9LE 01-499 7761

### Manager-Software Engineering

For a new project team exploiting Europe's foremost Communication Equipment.  
**c. £16,000**

**Based Europe**

Our Client is a major British and International force in the field of Electronic Telecommunication. Traditionally market leaders, by sales and innovation, they are now putting together a multi-disciplined team to develop and exploit internationally an advanced range of processor controlled exchange equipment. The team will work initially between London and Western Europe, but sales will be directed throughout the world.

This is a key post involving the inspiration, direction and management of a comprehensive team of engineers designing and supplying software systems applied to processor controlled telephone exchange equipment. The work will involve the use of structured programming and specialised high level language together with simulation to ensure the necessary standard of performance. It will involve liaison with all other functions within the Company at senior level and with major international customers.

Candidates will have a proven track record of directing and developing multi-disciplined teams and a record of getting quality results on time within pre-set financial parameters. Experience on real-time systems with on-line diagnostics will be particularly relevant to this position.

The compensation package is negotiable and reflects ability, experience and location. It will be competitive with any other comparable European based posts.

Applicants, men or women, should apply in strict confidence to P. M. Small, who is advising the Company, quoting Ref. 544/CW and stating experience, age, qualifications and present salary.

**CB-Linnell Limited**  
8 Oxford Street, Nottingham  
MANAGEMENT SELECTION CONSULTANTS  
NOTTINGHAM LONDON



# WORK WHERE YOU WOULD NORMALLY HOLIDAY!

## SYSTEMS PROGRAMMER

**SALARY c £5,000**

We are retained to recruit a Data Processing Professional for our Clients, a major International Manufacturing and Marketing Organisation. They are based in rural countryside, close to the Scottish lochs, and offering a wide range of recreational facilities. They are looking for an experienced Systems Programmer with a minimum of 2 years' experience of OS/VS software, and a knowledge of VS1 is particularly advantageous. They currently have IBM 370/145 hardware being upgraded to a 148 later this year. RJE facilities are being utilised, and they are implementing IMS, DC and DB. The successful candidate will enjoy excellent terms and conditions of employment with this secure, rapidly expanding Organisation. Full relocation expenses will be paid. Initial interviews will be held in Manchester, Birmingham, London and Glasgow.

CONTACT: DAVID WADE on: 061-833 0870 REF: 77/88/2

## BRISTOL SYSTEMS CONSULTANT

**Salary circa £5,000 p.a. plus profits share, plus company car**

We are to recruit a further Systems Consultant for a well-established, respected computer services company to work at a senior level and in an advisory capacity to users and potential users of the company's on-line commercial business systems. Candidates must have:

- \* a good sound understanding of commercial business systems
- \* a strong mainframe computer background to include a current programming understanding ideally of ICL 1900 series PLAN.
- \* be capable of customer contact and of representing the company as a Senior Technical Specialist.

This is an attractive well-paid post within a professional and dynamic privately owned computer services company, with further considerable opportunity for real career progression. Company benefits are well above average and include a company car and profit share.

FOR FURTHER INFORMATION REGARDING THIS POSITION PLEASE CONTACT WITHOUT DELAY: REG HEATH: ON 021-238 3781 REF. NO. 77/8/3

## LONDON & MANCHESTER (UK-wide territories)

## SENIOR SALESMEN (MINI COMPUTER)

**quota earnings 13K+, + car**

Our Client is an International US controlled mini computer supplier, well established in the UK. Its hardware and software are amongst the most advanced, exciting and powerful in the market place.

The UK sales force operates on a vocational basis. Specifically, candidates must:

- \* have a good understanding of the MEASUREMENTS & COMMUNICATIONS markets.
- \* be able to demonstrate a solid, successful sales track record in at least one of these markets.
- \* be high earners, well motivated and with a professional attitude to selling.
- \* be aged 27/40.

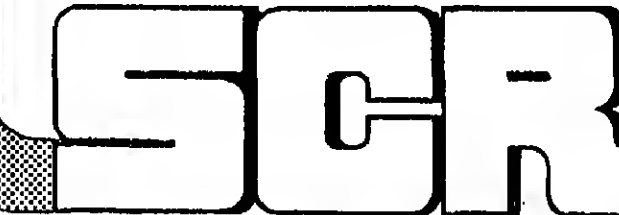
CONTACT: PETER RIGBY ON: 021-238 3781 ref: 77/08/04

### SPECIALIST COMPUTER RECRUITMENT LTD.

**BIRMINGHAM 021-236 3781 FREEPOST**  
Freeport, Equity and Law House, 35-37 Great Charles Street, Birmingham B3 2BR

**MANCHESTER 061-833 0676 FREEPOST**  
Freeport, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD

**LONDON 01-935 0671 FREEPOST 6**  
Freeport 6, 102, Blandford Street, London W1E 1JZ



## COMPUTER PROGRAMMER

Grade AP3-AP5 (£2922-£4095 plus supplements)

Applications are invited from programmers with experience in Cobol programming. The successful applicant will join a team of computer professionals developing a wide range of Local Government systems. An ICL 1903T 128K is presently installed using the George III operating system. Extensive use is made of communications equipment. Starting salary will be dependent upon qualifications and experience with Driver and George III experience an advantage. Possession of the British Computer Society qualification will qualify for a higher commencement salary. Salary and Conditions of Service are in accordance with N.J.C. Agreement for APT and C Services. The post is supernumerary and subject to medical clearance.

Applications in writing, stating age, present salary, present employer, experience, qualifications and two referees, to the Director of Personnel and Management Services, 7th Floor, Alden House, Tyneside Precinct, Sunderland Road, Gateshead NE8 3EL, no later than 18th August, 1977.

## LANCASHIRE COUNTY COUNCIL COUNTY TREASURER'S DEPARTMENT

## COMPUTER PROGRAMMERS

within the salary range £2688 to £4016

Candidates for the above posts should have at least one year's computer programming experience in COBOL, preferably working with ICL 1900 or 2900 equipment. The successful applicants will work as members of small teams each headed by a Senior Programmer.

The work covers both financial and technical applications for the County Council and other local authorities linked by R.J.E. terminals. There are some 40 Systems Analysts and Programmers, and on-line testing facilities are used.

The hardware consists of ICL 1904A and 1903A processors using EOS 60s operating under GEORGE III and II respectively, with numerous terminals, e.g. 7603, VDOs, etc., and this is currently being replaced by a newly commissioned ICL 2970 configuration, working under VME/8 with 2 m/b store and EOS 200s.

Starting salary within the above range will be in accordance with qualifications, experience and age. A Overtime Allowance of up to £400 may be payable in appropriate circumstances.

Applications stating personal details, academic and professional qualifications, present and past appointments, current salary, full details of experience and the names and addresses of two referees must be received by the County Treasurer, PO Box 100, County Hall, Preston PR1 0LD, by not later than Monday, 18 August, 1977.

## Systems Analyst from £8,000

*Production and Cost Control Arab Ship Repair Yard, Bahrain*

The new Arab Shipbuilding and Repair Yard in Bahrain is due to commence operations in October 1977. Urwick, Orr & Partners Limited have been retained by SURROU LIMITED to recruit for the following position. CONDITIONS OF EMPLOYMENT: Contracts are normally for 2-3 years. Salaries are tax free but subject to a small social insurance deduction. Free, herd furnished, accommodation, medical care, transport to and from work, passages home for annual leave and assistance towards education and electricity costs. Fluency in English is essential. Applicants, aged 25-45, should have 3-5 years experience, partly in an engineering production environment, preferably with some knowledge of shipyard terminology, and familiarity with programming and computer languages. The purpose of the job is to develop the system interface between the data processing services and management, to provide the information needs of Repair work programming, materials control, warehouse stocks, and costing. Starting salary - 8 Bahraini Dinars 5,482 per annum (approx £13,800; £8,000). Ref. SA/3766/CW. Please write without delay stating age, current salary and how you meet our Client's requirements, quoting the job reference on both envelope and letter. No information will be disclosed to our Client without permission.

**Urwick, Orr & Partners Limited** Baylis House, Stoke Poges Lane Slough SL1 3PF

## EXPERIENCED VRC PROGRAMMER

FOR SOFTWARE DEPARTMENT BASED IN HAYWARDS HEATH

Phone Gxdl Fri 1444 5/8/11

## LONDON BOROUGH OF LEWISHAM

**TOWN CLERK & CHIEF EXECUTIVE'S** To assist with the Council's considerable Computer Development, the following staff are required:

## SENIOR SYSTEMS ANALYST

£5,494-£8,055. Ref. CE 263/CW

A minimum of seven years' relevant computer experience including successful project implementation and the ability to lead analysts and programmers is essential.

## PROGRAMMERS

£3,694-£4,900. Ref. CE281/CW

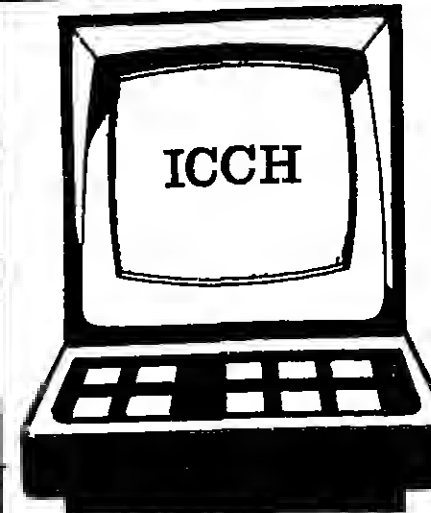
At least eighteen months' programming experience is required. The main language used is ANS COBOL. Knowledge of IBM equipment and BAL, as well as on-line programming experience would be an advantage.

The Borough's computer is situated in the Town Hall at Catford. The Borough's computer is a small professional team engaged in the design and development of manufacturing, marketing and accounting systems.

Candidates will have had past experience in a similar environment, and preferably a knowledge of production and inventory control systems.

Conditions of employment include four weeks' annual holiday, contributory pension and life assurance scheme and assistance towards relocation expenses where appropriate. Please write or telephone for an application form to the Personnel Manager, Hayward Tyler & Company Limited, P.O. Box 2, Luton, Beds. Telephone: Luton 31144, extension 95.

**Hayward Tyler** Manufacturers of pumps and motors. A member of the Stone-Platt Group.



## AMBITIOUS OPERATORS

**£3600 NEG.**

It is envisaged that the successful applicants will have 1 or 2 years' operating experience on an IBM mainframe, preferably in a DOS/VS environment. Knowledge of Grasp and CICS would be an added advantage. In-house and external training facilities are used extensively and career prospects are excellent.

Fringe benefits are excellent and include staff loans, interest-free season ticket loans, non-contributory pension scheme, free life assurance, 17 days' holiday (all 1977 holidays will be honoured) and luncheon vouchers.

## D.P. RECRUITMENT LIMITED

Kent House, 87 Regent Street, London W1R 7HF  
Tel: 01-437 2062/3/4 (24-HOUR ANSWERPHONE)



## William Key & Partners Limited

Our clients, based in the CITY of London, who are one of the largest processors of market research data in the U.K., are looking for the following staff to join an expanding team supporting and developing existing and new packages, and providing technical support within the Group.

## PROGRAMMING MANAGER

**£6000 +**

The successful candidate should have a minimum of 5 years' programming experience including management/leadership experience. Good FORTRAN knowledge is essential, preferably with some Assembler knowledge. Experience of operating systems and interactive computer knowledge would be advantageous, along with a commercial background.

## PROGRAMMERS to £4500

2 years' minimum programming experience including good FORTRAN or COBOL knowledge.

Programmers may work from home and in addition to a generous contributory pension scheme the company will also make a contribution towards employees' telephone bills. Ref. CW9502

For further information please contact Christine Jones quoting the above reference.

**WILLIAM KEY & PARTNERS LTD., 4 HALF MOON STREET, LONDON W.1**  
Telephone 01-493 2947 or Wotwarth (08904) 2408 evenings and weekends

## SYSTEMS ANALYST

**South Bedfordshire**

**Salary up to £5,500**

Hayward Tyler are part of a British-owned manufacturing group which is currently expanding its capital goods interests in many parts of the world. Its advanced design and development department, based at Luton, has incorporated teleprocessing facilities based on IBM 370/125 hardware.

A challenging opportunity exists for a Systems Analyst to make an immediate contribution to a small professional team engaged in the design and development of manufacturing, marketing and accounting systems.

Candidates will have had past experience in a similar environment, and preferably a knowledge of production and inventory control systems.

Conditions of employment include four weeks' annual holiday, contributory pension and life assurance scheme and assistance towards relocation expenses where appropriate.

Please write or telephone for an application form to the Personnel Manager, Hayward Tyler & Company Limited, P.O. Box 2, Luton, Beds. Telephone: Luton 31144, extension 95.

**Hayward Tyler** Manufacturers of pumps and motors. A member of the Stone-Platt Group.

## PROGRAMMERS

**Salary range: £3,900 - £4,800 p.a.**

London Transport is not only one of the largest urban transport authorities in the world; its activities also cover a wide range of supporting functions in advertising, real estate, catering and most fields of engineering.

It is not surprising therefore, that London Transport has a large expanding data processing department involved in a fascinating variety of work.

If you are keen to add to your experience and you really want to go ahead we can offer you:

- \* ICL 1900 Series and 2903 using G2, G3, MOP Moximop and ETS.
- \* IBM 370/145 using OS/VS1, CICS and DL1.
- \* Real-time, on-line and batch systems.
- \* Database development.
- \* Distributed processing.
- \* COM.
- \* Computer typesetting.

There are good prospects of advancement and valuable free travel is given on London Transport services at all times.

Appointments are normally made to Programmer grade but applicants with limited experience will be considered for Assistant Programmer posts (salary from £3,280).

If you have a good working knowledge of COBOL (possibly FORTRAN) and some experience in any of the above why not call our Systems Manager on 01-637 9144 today to get more details. Otherwise write to the Staff

Appointments and Development Officer, 55 Broadway SW1H 0BU, quoting reference 858C.

**LONDON TRANSPORT**



## DEPARTMENT OF COMPUTING PROGRAMMING ADVISER

To help provide a Programming Advisory Service to staff and students in UWIST and to assist with the general running of the computer service.

Applicants should have a degree and be conversant with the university environment. They must have experience in FORTRAN, ALGOL or COBOL. Salary £2904-£4811.

Registration (Qualifying Ref. CW) for students and application form to Personnel Section (Academic), UWIST, Cardiff CF1 3NU.

Closing date: 24 August, 1977.

University of Wales

## Cobol Programmer

This is an opportunity to join a young team with exciting growth potential. Having recently advertised for an analyst and a programmer, we find that our increased development plans necessitate the addition of another programmer to our team.

We are embarking on a major development phase to supply computing facilities to newly acquired companies in our group. Areas covered will range from order/invoicing, stock control, etc., to rather more exotic applications such as structural stress analysis and heat loss modelling.

Our equipment comprises one of the larger I.B.M. System 3/15D installations in the country, with a strong commitment to developing our 3270 T.P. network. You will probably be a junior programmer aged 20-23, who has the ability and the ambition to widen his/her knowledge of computing and business in many diverse areas.

If you think you can play an important and contributory role in our development plans and want to be involved in a major development at its inception, write giving full details to:

Personnel Manager

**KYLE STEWART**

Argyll House, Empire Way, Wembley, Middx. HA9 0NA

Write or telephone:

Mr. Manfred Nais, Merill Lynch House, 3 Newgate Street, London, EC1A 7DA

01-276 1000

## COBOL PROGRAMMERS

The ENGINEERING INDUSTRY TRAINING BOARD has immediate vacancies for enthusiastic COBOL programmers to join a progressive Computer team at their WATFORD Office.

The Board's ICL 1902S disc-based system is currently being used for Accounting, Payroll and General Commercial Applications and future expansion into the communications field is envisaged with the installation of two ICL 7600 systems with Video Terminals.

Chief prospects are excellent for PROGRAMMERS with a minimum of 6 months' COMMERCIAL experience.

## SALARY UP TO £3,787 (Including Supplements)

Conditions of Employment include — Paid Overtime as necessary 50p per day (luncheon Vouchers 23 days' Annual Leave) Contributory Pension Scheme Sports & Social Club facilities Relocation expenses as appropriate

Interested? Write to: PETER HART, Chief Programmer, at WATFORD 4422, Ext. 31, or write for an application form to:

**MRS. D. L. OYFORD PERSONNEL OFFICER ENGINEERING INDUSTRY TRAINING BOARD 41 CLARENDON ROAD WATFORD WD1 1HS**

Write or telephone:

Mr. Manfred Nais, Merill Lynch House, 3 Newgate Street, London, EC1A 7DA

01-276 1000

01-276 1000

01-276 1000

01-276 1000

01-276 1000

01-276 1000

01-276 1000

01-276 1000

01-276 1000

01-276 1000

01-276 1000

01-276 1000

01-276 1000



### A Prominent Group Hardware Design Engineers

#### MINI AND MICRO REAL TIME SYSTEMS

**Hertfordshire** **Salary negotiable £5,000**

A well renowned international group is expanding fast in the field of banking terminals and financial security systems and need a number of experienced engineers to join their Hertfordshire location.

Electronic hardware design engineers are invited to be part of a team working on design of communications and peripheral interfaces using analogue and digital techniques.

3-5 years' experience in TTL and MOS design is essential together with a general knowledge of computer hardware.

Experience of micro processor hardware and software is also desirable although relevant training will be given in this field.

Please reply to our CROYDON office quoting reference CW51-75.

01-686 9693 (24 HOUR ANSWERPHONE) | 061 236 2419 FAULKNER HOUSE,  
19, PARK STREET, CROYDON, CR9 1TN | FAULKNER STREET, MANCHESTER, M1 4YD

COMPUTER AND PROFESSIONAL PERSONNEL CONSULTANTS **CAPP ASSOCIATES** Computing Services Association  
LONDON AND MANCHESTER

1  
**INTERMEDIATE PROGRAMMER**  
(£3834-£4344 plus supplement)

The Information Services Division of the Common Services Agency has a vacancy for a programmer to work on a variety of financial, administrative and medical applications on its ICL 2803 computer system.

Applicants must have a good knowledge of ICL Cobol and one other language e.g. Fortran, RPGII, Plan or Fileaid and at least three to four years' practical experience on financial systems including Payroll.

Knowledge and experience of the health service will be an advantage. Application forms and further information are available from, and should be returned to, Appointment Section, Common Services Agency, Trinity Park House, South Trinity Road, Edinburgh EH8 3SE, no later than 18th August, 1977.

**CAPITAL APPTS.**  
**PETROCHEMICAL**  
project development N.W. London. Technical programme required with FORTRAN experience. Salary £2,500-£3,000 p.a. **3M Payroll** **017 5551 441/445 0468 ext.**

A MULTI NATIONAL COMPANY ON THE SOUTH COAST HAS A NUMBER OF MAJOR SYSTEMS TO BE DEVELOPED AND IMPLEMENTED IN THE UK AND SEVERAL COUNTRIES THROUGHOUT THE WORLD AND THEREFORE REQUIRES:

## TWO ANALYSTS

### SOUTH COAST

Candidates should have played a major role in developing at least one large disk based system and should have the ability to communicate well at all levels. Both positions present excellent career opportunities and the chance to move in to other areas of data processing.

**MORTGAGE SUBSIDY**

**GENEROUS RELOCATION PACKAGE**

**POSSIBLE INTERNATIONAL TRAVEL**

**STAFF RESTAURANT**

**NON-CONTRIBUTORY PENSION MEDICAL AND LIFE ASSURANCE**

The salaries for these positions are negotiable depending on experience.

For more information and to arrange an informal interview contact **STUART WINFIELD**

**RECRUITMENT RESOURCES**

2 Great Marlborough Street  
London W1V 1DE  
Telephone 01-439 9817

## Analysts and Programmers for Management Services in the City.

Whitbread & Company Limited, one of Britain's largest brewing groups, is currently engaged in an expansion programme with the commitment to develop and install advanced DP systems utilising Distributed Intelligence and nationwide Terminal networks. This will be based on a complex of Honeywell 725's and level 64's strategically situated throughout the UK. All development work is centralised through our Management Services Department located at Chiswell Street, London E.C.1.

Due to the increasing demand for the Department's services within the Group we may need to strengthen and expand our project teams over the next few months by the appointment of a number of Analysts and Programmers with various backgrounds and levels of experience. The department operates a career structure at all levels which provides opportunities for advancement through programming to analysis.

### Systems Analysts £5000-£7000

Candidates should have sound academic qualifications and at least 2 years experience in Systems Analysis, preferably in a commercial environment. The more Senior positions will require a minimum of 4 years' relevant experience. The applications are wide ranging for an analyst computer order entry system, to standard commercial applications covering the finance, production distribution and marketing areas of the Company. Knowledge of Honeywell equipment is desirable but not essential. There is the opportunity to join the department as an Analyst/Programmer or an alternative to pure systems analysis. Ref: HQ36

### Programmers £3500-£6000

Programmers with upwards of 1 years' COBOL experience are required to join an established programming team. The more senior positions will involve supervision of other programmers working in project teams. Honeywell experience would be a valuable asset to any candidate, although not essential. The main language is COBOL, however there are applications where a working knowledge of Easycode, RPG, Fortran and Fileaid would be a distinct advantage. Opportunities exist for the right people to progress through our Analyst/Programmer function into Systems Analysis, or for the professional programmers who do not wish to move into analysis there are Team Leader Vacancies. Ref: HQ35

Actual starting salaries will depend on individual qualifications and experience, and will be supported by a substantial range of fringe benefits. Please write to or phone for an application form: J.F. Jarvis, Selection Manager Whitbread & Co. Ltd., Chiswell Street, London EC1Y 4SD. Tel: 01-606 4455 Ext. 251, specifying the appropriate reference.

**WHITBREAD**

### Experienced Data Processing Staff

Salary range approximately £2,028-£5,472 per annum

The Authority at present operates duplex 512K 370/135s under DOS/VS. There is an extensive teleprocessing network under SHADOW which is expanding to over 100 remote and local VDUs connected via a dozen multi-dropped lines to 370/4 communication controllers. The computers are scheduled for upgrading in IBM 370/148s next year.

It is planned to convert to DS/VS1 while retaining a limited DOS and CMS use under VM. Applications from programmers with OS systems experience would be welcome as would those from IBM DOS operators who are prepared to work shifts.

Recruitment could be at any level within the above salary range for Data Processing Officers depending on age, ability, training and experience. Further training would be available according to the needs and aptitudes of the individuals recruited.

Opportunities exist for transfer to programming and systems analysis work for operators with the necessary aptitudes.

2D days' holiday (minimum)  
Five day week, hours 8.45 a.m. to 4.45 p.m.  
Superannuation scheme - interchange arrangements.  
Subsidised Staff restaurant.

Applications, quoting reference CW and giving full particulars of age, educational qualifications and previous experience should be sent not later than 15th August, to:

Laurence O. Wild, C.Eng., F.I.C.E., F.I.Mech.E., F.I.W.E.S., Operations Manager, Room 800, Thames Water Authority, Metropolitan Water Division, 173 Rensbury Avenue, London, E.C.1.

## Thames Water

Metropolitan Water Division

## Rolls-Royce Limited Aero Division

### Computer Operations

Rolls-Royce are planning for the 1980's when we intend to win an even larger share of the World's demand for advanced aero engines.

Data processing has been an essential service within this Company for more than twenty years and we are coming to the end of an equipment re-configuration cycle which is capable of supporting the increased requirements of all areas of our business.

In Derby this re-configuration includes 3 X IBM 370-168 units and IBM 3850 (mass storage) running under control of MVS/JES 3 operating environment. Programmers are now needed to complete the picture.

Applications are invited from candidates who have at least one year's experience of working on a project and are capable of producing good quality work to schedule. The main programming language is PL/I and where necessary we will offer training in that language to successful candidates.

Salary will be in accordance with age, qualification and experience.

Systems Analysts are also required in Derby, to assist management by analysing business situations and problems, to plan and conduct the design of solutions which may involve the application of computer technology to implement the agreed solutions.

Candidates for the senior analyst posts should preferably have a degree with relevant background experience and proven ability, those for analyst posts have a degree or other suitable qualification and for trainee analysts the minimum qualification is three GCE 'A' levels.

Salary will be in accordance with age, qualification and experience.

The Bristol Group requires Application Programmers to work with the systems design teams in the preparation of detailed computer specifications and to code, test, implement and maintain the systems.

Candidates should be aged up to 35 years with good educational background and at least two years programming experience preferably COBOL, but candidates with competence in PL/I or other languages will be considered.

A sound knowledge of JCL, RJE and the IBM's experience would be an additional marked qualification. Salary will be paid in accordance with age, qualification and relevant experience.

In each of the above we shall be pleased to discuss relocation expenses with candidates male or female who are invited for interview.

The Company operates a comprehensive Staff Pension Scheme.

Enquiries should be addressed to:-

Mr J A J Clarke, Senior Personnel Officer  
Rolls-Royce Limited  
PO Box 31 Derby DE2 6BT  
Telephone Derby 42424 Extension 109

or  
Mrs J. King, Staff Employment Office  
Rolls-Royce Limited  
Peachway, Bristol  
Telephone Bristol 893871 Extension 231

## DATEC

### EDP CAREER OPPORTUNITIES

**£4,500-£7,500**

DATEC is AUSTRALIA's largest and oldest independent software house specialising in customised computer applications. In 11 years of operation we have grown to some 100 professional staff in Sydney, Melbourne, Brisbane, Canberra, Perth and Adelaide.

It is our intention to operate a Contract Systems and Programming Division in the Greater London Area. Positions will be available over the next few months for programmers, analyst programmers, range £4,500 - £8,000, technical specialists, project leaders and consultants range £5,000 - £7,500. These positions could also be made available to people wishing to emigrate to Australia within a 6-12 month period of joining Datec in London.

Datec requires applicants to have a high level of expertise in one or more of the following:-

- Applications programming in Cobol, PL/I, RPGII, etc.
- Project Management
- Systems analysis and design
- Commercial mini systems
- Machine house systems support
- EDP consulting
- Database systems - DL/I, Total, etc.
- Communications/on-line systems - CICS, TIPS, DRIVER, etc.

**CAREER OPPORTUNITIES:** In London, the company will operate in all areas of commercial applications - consulting, systems design and programming, on mainframes as well as commercial minis, and EDP training.

Our founder and Managing Director, Mr. Harry Douglas, will be pleased to receive written applications from prospective candidates, addressed to him at the London Hilton Hotel, Park Lane, London. Applications should be sent to arrive by 10th August, quoting ref. CW-LB-77.

DATEC PTY. LTD.  
220 GEORGE STREET, SYDNEY, N.S.W. 2000  
AUSTRALIA

## HALFORDS

### SENIOR COMPUTER OPERATOR

Interested in working with an enthusiastic crew of computer operators?

This might be your chance if you can supervise, operate a computer, assemble jobs and control a file laboratory.

We run an ICL 1903A with a wide range of peripherals and use George II exclusively.

Our working environment is pleasant, our job types are varied and interesting. You should, however, be prepared to work shifts.

There are career development opportunities in Programming for those who can show a potential for such work.

Please write with details of your business experience to date with education records, to:

K. M. Mackay  
Halfords Limited  
100/102 Street Drive  
Washford West  
Redditch  
Worcs.  
B98 0DE

**DATA PROCESSING CONTROLLER +**

The Data Processing Controller with some knowledge of systems and programming is required by the Institute of Personnel Management to head the Membership records section. This is a junior executive post with a commencing salary up to £3,750, L.V. 45p per day and 4 weeks' holiday.

Applications in writing to J.T. ELISON  
General Administration  
Manager  
Institute of Personnel Management  
Central House  
Upper Woburn Place  
London WC1

**PROGRAMMER**

Applicants are invited from experienced graduates to work for SWIRL, a consultancy Company based at the University of Bath.

The Programmer will work in conjunction with staff of the University Computer Unit on the development of computer applications for research and development projects undertaken by SWIRL.

Salary will be within the range £2904 to £4811 per annum.

Application forms available from the Personnel Officer, University of Bath, Claverton Down, Bath, quoting reference number 77/B4. Closing date will be Friday, 18th August, 1977.

**RECRUITMENT RESOURCES**

2 Great Marlborough Street  
London W1V 1DE  
Telephone 01-439 9817

**CAPITAL APPTS.**  
**FORTRAN**  
Programmer urgently required for Industrial and Scientific development.  
£3,500-£5,000  
All areas  
Phone for free list of vacancies  
**017 5551 441/445 0468 ext.**

**IBM DOS OPS**  
12 months' experience  
Essac. c. £3,500 p.a.  
Phone 01-439 9481 (24 hours)  
**EFFECTIA GRAVIS**  
Personnel Consultants

**CONTRACT - NORWICH**  
Assembler DOS/CICS/VS  
13 months initially  
Phone (0603) 887233  
any time up to 9 p.m.

**Programmer/Documentation Analyst**

We are a large international merchant bank operating on 3 PDP 11/50's and 2 PDP 11/70's on a real time financial system.

We are seeking personnel with experience in BASIC or AIMS to join a team involved in the documentation and maintenance of existing programmes.

In addition to a good salary, we offer fringe benefits which include L.V.'s of 50p per day, House mortgage assistance, contributory Pension Scheme and free Life Assurance cover.

Please write with career details, or telephone for an application form.

J. A. Newman, Assistant Staff Manager,  
Kleinwort Benson Ltd. 20 Fenchurch Street,  
London EC3P 3PB  
Telephone: 01-623 8000 Ext. 7088

**KLEINWORT BENSON**  
Merchant Bankers

### 1900 COMPUTER ENGINEERS

As a result of continued expansion Mills Associates Limited, National Computer Service Organisation, requires first-class Engineers in the following areas:

**SOUTH WALES** **LONDON**  
**TYNE AND WEAR** **SCOTLAND**

Candidates must have experience of working on:

1902A - 1802T Range  
1801A  
1000 Peripherals  
1900 Communication Systems

An attractive salary is offered commensurate with experience together with a profit-sharing scheme, stand-by and call-out payments. London allowance paid 4 weeks' annual holiday. Company car.

Applications, giving career details in detail, in strict confidence to:-

J. S. Gould, Esq.  
Mills Associates Ltd.  
Wenslow Road  
Monmouth  
NP5 4YE  
Tel. Monmouth 2131

Branches at: Monmouth, Bristol, Birmingham, Chertsey, Cardiff, Edinburgh, Manchester, Nottingham, Swansea.

**Mills Associates Ltd.**

### MERSEYSIDE COUNTY COUNCIL JOINT COMPUTER UNIT

### PROGRAMMER

(£1,215 - £4,085 p.a. + supplements)

The successful applicant will have at least 18 months COBOL experience on any machine and will be part of a programming team, having the opportunity to specialise in systems software and systems analysis.

A 192K 1804S under GEORGE 3 is presently in use. Batch and on-line applications are being developed, varying from highway engineering to stock control. Terminals are used for all development work.

Salary negotiable in accordance with experience.

Application form from the County Treasury, Merseyside County Council, P.O. Box 95, Metropolitan House, Old Hall St., Liverpool L69 3EL. Closing date: 22nd August, 1977.

## Systems Analyst

### A key role with career prospects at Ford Daventry.

Ford Daventry is the Distribution Centre for Parts and Accessories for all Ford Vehicles built in the UK.

It is a large scale, highly sophisticated operation utilising the most up to date computer systems to ensure its efficient running and maintain a high output.

To Systems Analysts particularly graduates, with at least two years programming experience, including ideally ANS COBOL for IBM 370, this fast moving environment offers considerable challenge, scope and career opportunity.

Working on a variety of assignments, you will analyse and improve systems, methods, and mechanised equipment. You will observe procedures in operation and make recommendations for modifying them. This position will involve close liaison with Ford management at all levels.

Obviously, this is very much a role for an effective communicator - a man or woman with natural organising, planning and co-ordinating abilities. An added interest will be a substantial number of trips to Spain, or Germany each year to assist in launching major new systems in our European locations. An understanding of German and/or Spanish will be a distinct advantage.

We offer a salary of up to £4800 depending on your qualifications and experience and there are first class promotion prospects not just at Daventry but elsewhere within the Ford Organisation. Our comprehensive fringe benefits package includes a special car purchase scheme.

Please write, giving sufficient details to make an application form unnecessary to Alan Mitchell, Supervisor Salaried Personnel at Training Room 18/404, Ford Motor Company Limited, Royal Oakway South, Daventry, Northants NN11 8ST.

**Ford** leads the way

### Assistant Engineer c. £4200

Scicon Limited is a leading member of the International Service Group. Our team of 250 professional staff have a broad base of experience which can be drawn upon to assist in the complete project in the consultancy and computer systems markets.

To maintain our leadership in the field of computer systems we need to develop our staff in the latest methodology. This is why we are currently looking for a person who is a computer systems Assistant Engineer.

The successful candidate will be responsible to the senior engineer for the smooth running of the computer room facilities consisting of several mini and micro computer systems, peripherals and terminals. He/she will perform preventative maintenance, organise co-ordinate maintenance, provision supplies of materials/consumables, assist in installations and further expansion of the facilities.

Candidates should have typically H.N.C. or Services background with experience in microcomputers and data communications. A sound engineering background is highly desirable.

Salary will be commensurate with experience and qualifications and generous fringe benefits are provided.

Please telephone or write for an application form to:

Sue Brewer  
Scicon Computer Systems Ltd.  
Sanderson House  
49-51 Berners Street  
London W1P 4AQ  
Telephone 01-550 9920

A member of the I.S.G. Group

**Scicon**

## Programmer/Documentation Analyst

We are a large international merchant bank operating on 3 PDP 11/50's and 2 PDP 11/70's on a real time financial system.

We are seeking personnel with experience in BASIC or AIMS to join a team involved in the documentation and maintenance of existing programmes.

In addition to a good salary, we offer fringe benefits which include L.V.'s of 50p per day, House mortgage assistance, contributory Pension Scheme and free Life Assurance cover.

Please write with career details, or telephone for an application form.

J. A. Newman, Assistant Staff Manager,  
Kleinwort Benson Ltd. 20 Fenchurch Street,  
London EC3P 3PB  
Telephone: 01-623 8000 Ext. 7088

**KLEINWORT BENSON**  
Merchant Bankers

### DINERS CLUB LTD. SENIOR SUPERVISOR

We are seeking a senior supervisor to be responsible for our busy D.P. Department which handles all aspects of card processing from receipt, punching, processing on a Date 100 terminal, on-line transmission, and post processing on IBM sorters and collector.

The successful applicant will have experience of Unit Record Equipment and Terminal Operations, and will be accustomed to meeting strict deadlines. He/She will be involved in our new installation based on MICR Technology which is due to come on-line within 18 months.

Supervisory experience and a business/financial background would be an advantage.

An excellent salary will be offered to the successful candidate with generous fringe benefits, including a profit sharing scheme.

Please write with details of your career to date to:

Janet Bell, Assistant Personnel Manager  
DINERS CLUB LTD.  
214 Oxford Street, London W.1  
Tel: 830 3040

### Puzzle answer

Let L be length of train, X the distance first tramp (A) walks in 20 seconds, and Y the distance second tramp (B) walks in 18 seconds. We know that the train travels (L+X) in 20 seconds, and (L+Y) in 18 seconds, and 30(L+X) or 100(L-Y)/18, in 10 minutes, i.e. 60 minutes. Now since A walks 30X in 10 minutes, the distance separating A and B at the moment the train reaches B is 30(L+X) - 31L, or 31(9X+10Y).

Finally, closing speed between A and B is clearly 9X+10Y in 180 seconds. So they will meet in 41 times 180 seconds, i.e. the 18 seconds it took for the train to pass B. This amounts to 7380 seconds.